DOCUMENT RESUME

ED 332 438 EC 300 300

AUTHOR	Hoctor, Marge, Ed.
TITLE	Teaching with Technology.
INSTITUTION	California Association for the Gifted.
PUB DATE	Jan 91
NOTE	37p.
AVAILABLE FROM	California Association for the Gifted, 23684 Schoenborn St., Canoga Park, CA 91304.
PUB TYPE	Collected Works - Serials (022) -- Reports - Descriptive (141) -- Guides - Non-Classroom Use (055)
JOURNAL CIT	Communicator; v21 n1 Jan 1991
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	*Computer Software; Creative Development; *Creativity; Distance Education; Economically Disadvantaged; Educational Change; *Educational Technology; Elementary Secondary Education; *Gifted; High Risk Students; Information Networks; Information Services; Integrated Activities; Language Arts; Limited English Speaking; Microcomputers; Resource Allocation; Rural Education; Teacher Role; *Teaching Methods
IDENTIFIERS	California

ABSTRACT

This journal issue gathers together several articles on teaching with technology, with special focus on teaching of gifted students in California. "Computers and Creativity: Tools, Tasks, and Possibilities" (Bernard J. Dodge) discusses how teachers can establish an environment that will nurture creativity through use of computers. "Technology Resources in Education (TRIE): Opportunities for Collaboration" (Craig Blurton) explains how teachers of gifted and talented students can make use of the TRIE electronic information service developed by the California Technology Project. "Increasing Educational Options through Distance Learning" (Robert Threlkeld), focusing primarily on distance learning for rural areas, examines the use of satellites and telephone lines and cites exemplary land-based distance learning programs. "Technology, the Gifted, and the Language Arts" (Stephen Marcus) describes new technologies for teaching language arts to gifted students, while emphasizing that the tools' vitality depends on talented teachers who offer an informed exuberance. In "An Open Letter to Parents of Students," David Moursund notes the importance of student access to computers and the value of integrating computer use with reading, writing, arithmetic, and problem-solving instruction. "Vision: Technologically Enriched School of Tomorrow (TEST)" (Gary G. Bitter) presents five recommendations of the International Society for Technology in Education. "Alternatives to Integrated Instructional Systems" (Peter Kelman) criticizes integrated instructional systems as being an inappropriate use of computers with students at risk and wasteful of limited school computer resources. Other papers include: "Technology and Change: From the Renaissance World to Microworlds" (Gail Marshall); "Empowering the Teacher" (David Dockterman); "Confessions of a Maverick Moderate" (Anne Beversdorf); and "An Investigation of Giftedness in Economically Disadvantaged and Limited English Proficiency Students" (Mary M. Frasier). (JDD)

THE JOURNAL OF THE CALIFORNIA ASSOCIATION FOR THE GIFTED
VOLUME XXI · NUMBER 1 · JANUARY, 1991

COMMUNICATOR

TEACHING WITH TECHNOLOGY

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Technology and Change: From the Renaissance World to Microworlds

by Gail Marshall

Imagine living in Rome while the Sistine Chapel was being built. Think about the excitement Englishmen felt as inventions, large and small, one after the other emerged from the workrooms and small factories dotted all over the English countryside. Biographies of writers and poets of the 1920's tell us about the daily excitement they felt as they pioneered new styles. Major revolutions, not just the political ones but the social, intellectual and technological ones as well, are exciting. They stimulate and challenge. But they also confuse and frustrate people. They exacerbate old tensions and induce new headaches. To cope with change we must accommodate between patterns of the past and new ideas and tools. When Newton wrote about a new vision of the physical universe, the solitary Englishmen, who tinkered and puttered with the primitive equipment they used in daily life, saw immediate, practical applications of Newton's laws that could improve productivity. But others saw a threat to the stability of their daily lives. When renaissance artists thought about immortality, they saw saints and angels that looked like men and women walking the streets of Rome, or Siena, or Florence. No more shadowy angelic clouds for the fifteenth and sixteenth century artists. For them the revolution in man's thinking about his relationship to the deity inspired visions of immortal man as mortal man made more splendid. But that change aroused uncertainities about man's place in the world and his security in the universe. And when World War I destroyed peoples' hopes for a calm, ordered society, the writers of the 20's responded with stories and poems that mirrored the dislocation. Sometimes the stories were more unsettling than the debacle in the trenches of France!

Painting the Sistine Chapel ceiling involved more than a vision of what the afterlife looked like. Technology, in the form of ropes, scaffolds, pulleys, a visual geometry of shapes and planes, brought Michelanglo's private vision into public purview. To turn Newton's vision of a physical universe into a series of productive inventions the nuts and bolts (literally!) of production were needed. The dreamy English countryside was punctuated by bursts of steam and screeches of turbines. Slag and soot were as much a by-product of invention as speed. But Michelanglo, Newton, and the host of artists, writers and inventors, who transformed our world, and our view of the world, focused on the goal—to produce exciting, rewarding, ennobling creations. The machinery, all the bits of wood and glass and metal, were not ends, but means to those splendid ends, the David statue in Florence, the steam engine, *The Waste Land*.

Change produces confusion and despair. Think about being a visitor to Rome and not understanding the citizens' references to space, color and line! Think of the frustration of being in eighteenth century England and not understanding all the talk of gravity and acceleration. As change occurs, keeping up with change is essential or we feel a sense of alienation, of distance. As difficult as it is to master the vo-

Continued on page 32

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GUEST EDITORIAL

by Marge Hoctor

Two of the challenges parents and educators of gifted students have faced is to find ways to help them to be critical thinkers and problem solvers and to provide them with activities which challenge and develop their higher-order thinking skills.

Although there is not one sure way to meet this challenge – no panacea – technology, a relatively new tool at our disposal, can provide much welcome assistance. Computers, instructional television and laserdiscs can open avenues which make it easier for us to offer enriched learning experiences to our students. Appropriate programs such as word processing, database, and spreadsheets are tools which allow students to go beyond the mechanical and tackle computer problem solving. Simulations, critical thinking software, and others provide quality exercises in problem solving.

Students of today can simulate a complex chemical experiment, take a wagon train trip to Oregon across the Overland Trail, or dissect a frog. The use of the computer as an information retrieval system, and as a companion to a laserdisc player will allow our students to research and create high-quality presentations of complex ideas and information.

As we enter the technological age, it is essential that students become computer literate and proficient with hardware and software. In addition, optimal use of technology will allow us to provide our students with experiences unavailable to them until now.

Computers will never replace the teacher. I advise the teachers I work with to use the computer to provide experiences that otherwise couldn't be duplicated in the classroom. When something can be better done without the use of a computer, it should be done that way. But technology has advanced to the point that many real-life experiences can be simulated by and provided by the computer in the classroom. We are obligated to make these experiences available to our students.

Marge Hoctor, Supervisor of Media and Technology Services for Garden Grove Unified School District, was Guest Editor for this issue of the Communicator. *Marge, Board member and chair of the Outreach Committee for CAG, relied on her many friends and associates around the state and the country to write the articles you will find within. We are indeed fortunate to have had the benefit of Marge's efforts, and appreciate her willingness to set the standard for excellence.*

PUBLISHED BY THE CALIFORNIA ASSOCIATION FOR THE GIFTED

Administrative Assistant, Sharon Mountford, 818/888-8846

The *CAG Communicator* is published five times during the year, in September, November, January, April, and June. Opinions expressed by individual authors do not necessarily represent official positions of the Association. Subscriptions are available to non-members at an annual cost of $15.00.

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PRESIDENT'S COLUMN

Sandra Kaplan

Current trends in general education appear to parallel many of the elements that traditionally have been related to a differentiated curriculum for the gifted. These include the development of productive thinking skills and the integration of disciplines into the study of a topic or theme. Many educators view positively this parallel between the general and differentiated curriculum. However, some educators perceive the similarity of these elements as potentially eroding the concept of a differentiated curriculum for the gifted.

Regardless of the point of view educators hold, two issues appear pertinent to the parallel between the general and differentiated curricula. First, the distinctiveness of a curriculum defined as differentiated for the gifted is less a matter of the elements included within such a curriculum and more a consequence of the gifted students' interaction with the curriculum. No single element within a curriculum ever could be intended for only one segment of the student population. It is when and how such elements of a curriculum are taught that determines their appropriateness for gifted students.

Second, a quality program for the gifted is one that spills over and affects the education for all students. One measure of a successful gifted program is the degree to which it has had an impact on general education. It appears that the current focus in general education on the elements usually appearing in curriculum for the gifted could be interpreted as meaning that gifted education has contributed to the betterment of education for all students.

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THE VIEW FROM SACRAMENTO

by Barbara Brandes

The view from Sacramento these days combines a relatively hopeful political climate with a worrisome fiscal forecast, at least for the near term. Governor Pete Wilson has demonstrated an encouraging interest in working collaboratively with the Legislature, with Superintendent Honig, and with educators generally in improving the quality of schooling in California and in making "prevention" rather than "remediation" the hallmark of our approach to education and to social services. However, bringing these ideas to fruition costs money. We will probably have to wait out the current rather dismal fiscal situation in the state before we see the results of these new approaches.

As you know, each year the state budget for the following fiscal year is shaped through a series of negotiations that take place between January and (hopefully) the end of June. The process begins when the "Governor's Budget" is released in January and serves as a starting point for the arduous process of developing a final budget. This budget proposal gets revised in light of changes in state revenue projections, any new legislation that may augment the budget, and, finally, the Governor's "blue pencil," which can reduce or eliminate allocations before the budget becomes law in the "Budget Act."

We were encouraged to see that the Governor's Budget proposed for 1991-92 contains an augmentation for GATE. This augmentation includes $1.3 million to provide statutory growth funding for GATE and $2 million to fully fund new GATE districts. Of course we cannot be sure that these funds will remain in the final version of the budget, especially if the fiscal projections for the state become bleaker. However, the fact that these funds are in the budget proposal is a hopeful sign. Of course, we had expected and hoped for full funding of new GATE districts last year. It is disappointing to see that there are no cost-of-living adjustments (COLA's) for GATE or other programs in the Governor's Budget.

The outlook for funding in the California Department of Education (CDE) remains grim. The Department has eliminated more than 80 positions over the past several months and drastically curtailed expenditures for travel and other activities. We in the GATE unit, as in other units throughout the Department, are frustrated over our inability to provide the assistance and support that is needed. We do feel fortunate, however, that we are able to provide a staff development opportunity for GATE staff and for other education professionals through our Jacob Javits grant. We are now midway through the first year of "Building and Coalition for Excellence: Project Open-GATE" and are gratified that many of you have had the chance to participate in the teleconferences and related staff development activities. Next year the project will have a much more in-depth focus on curriculum and instructional strategies that nurture the gifts and talents in our young people.

Computers and Creativity: Tools, Tasks, and Possibilities

by Bernard J. Dodge

Over twenty years ago in *Education and Ecstasy* George Leonard sketched his vision of a school in the year 2001. He described two parents visiting their three year old in a room filled with computer terminals which controlled a single screen wrapped around the walls. Their daughter was engrossed in a lesson on word play, in which she learned conventional spelling by creating alternate spellings for words like *cat* and *tiger*. To her right, a girl studied primitive cultures while to her left a six year old explored simple calculus. As the program prodded and encouraged her, animated images of cats and tigers appeared over her station, at times interacting with the pygmy blow darts of the girl to the right and the wheels in motion of the lesson to her left. The classroom Leonard described was lively and intense, individualized and social, structured and surprising. With 2001 only ten years away, how close are we to having such an environment? How can we use computers today to enhance creativity?

Creativity has been defined in a number of overlapping ways. According to Warren (1985), creativity is "... a process of freedom operating within structure aimed at a problem or opportunity for expression... Creativity is not necessarily exotic or dramatic. Most people experience it, sometimes without thinking of it as creativity." Most definitions include three major components: that creativity has a *product*, and that the product is both *original* and *appropriate*, or *novel* and *valuable*. The originality-appropriateness distinction is a useful one. As one paper put it, "Appropriateness without originality is mundane, and originality without appropriateness is simply bizarre." (Costa, Miller & Quinby, 1985). Of course we don't expect students of school age to generate work that is important to society and that has never been seen before. It is sufficient that the product be appropriate to the given task and original within the limited experience of the learner.

The process of creativity is inherently engaging and self-rewarding. Czikszentmihalyi (1988) discusses his concept of *flow*, which is the total involvement we feel when meeting challenges which match our skills. The creative process is a series of challenges faced and conquered, ranging from large ones (defining a character in a play) to small (choosing just the right word to finish a sentence). There are degrees of creativity in almost everything we do, at least potentially. The task for teachers is to establish an environment in which greater creativity is nurtured. Computers can help.

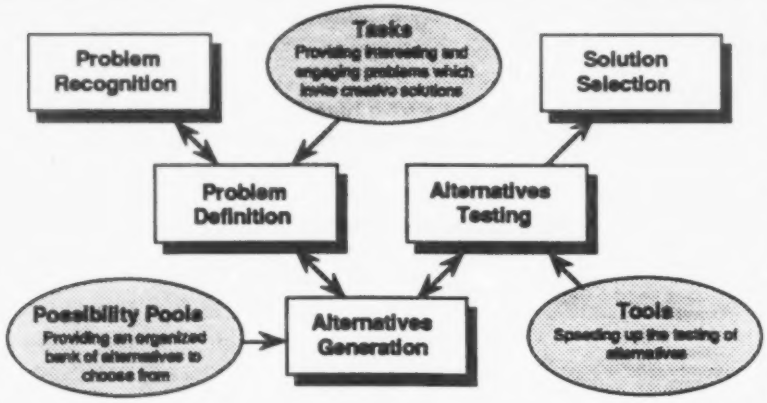
Computing Creatively

How are computers and creativity related? Not all of the requirements to establish an environment for creative work are achievable through the use of computers. Instituting an atmosphere of having freedom to fail, and of valuing originality – these are roles for the teacher that are not tightly related to technology. On the other hand, several aspects of creativity lend themselves quite well to classroom computing. These include:

- Flexibility, mobility – the ability to shift perspectives... to redefine a problem in the direction of greater or lesser abstractness.
- Fluency – the ability to generate many ideas, knowing that only a few will be valuable.
- Association – the ability to put disparate elements together to make new combinations.
- Testing – the ability to quickly try out ideas, discarding those that don't work.

Figure 1 shows a widely used model of the creative problem solving process. Overlaid on

Figure 1. Where computers enhance the creative process



the model are three additional terms describing how computers are used to practice and enhance creativity. Computers can be used:

1) as a *tool* for creativity;
2) to present a *task* or stimulus for creative activity; and
3) as a *possibility pool* to be used to support creativity.

In his Multiple Intelligences Theory, Howard Gardner (1983) has proposed that intelligence is not a single dimension, but rather that it is developed in varying degrees in at least seven categories: linguistic, musical, logical-mathematical, spatial, bodily-kinesthetic, interpersonal, and self-knowing. Computer use lends itself easily to the first four of these multiple intelligences. According to Gardner, for any given individual, highly developed originality occurs principally within a single domain (1983, page 288). Thus it makes sense to analyze creative computer uses within the domains of Gardner's theory as well as across the proposed categories of tools, tasks, and possibilities.

Table 1. Computer uses across four domains of intelligence

Computer Use

Intelligence Domain	Tasks	Possibility Pools	Tools
Linguistic	Writing prompts, story starters	Thesaurus, *IdeaFisher*, *Plot Machine*, rhyming dictionary	Word processing, *HyperStories*, outliners, hypermedia
Musical	Unfinished score, song to be re-orchestrated	Libraries of MIDI files, digitized sounds	Sequencers, synthesizers, samplers, scoring software, hypermedia
Logical-Mathematical	Unfinished programs, incomplete templates	Subroutine libraries	Spreadsheets, *Geometry Supposer*, *LOGO* and other programming environments, *Stella II* simulation system, hypermedia
Spatial		Clip art collections, Libraries of sample page layouts	Painting and drawing programs, animation tools, CAD software, desktop publishing, hypermedia

Tools

Twenty-five years ago, using a computer usually meant filling out a coding sheet with lines of programming, handing it to someone who would keypunch it on cards, waiting for the cards to be submitted to the computer and for sheets of output to return. The lag between trying an idea and seeing the results would be hours, if not days. The principal way in which computers today aid creativity is by speeding up the process of trying out ideas (Rasch, 1988). The term *ideas* in this context can refer to words, images, sounds, and mathematical relationships. In the domain of visual creativity, for example, appropriate tools include graphics, animation, and desktop publishing software (Hamilton, 1987). For musical creativity, a wide range of software is available for sequencing, scoring, and performing (Upitis, 1989).

One class of software that is particularly useful as a creativity tool is the outliner or idea processor. Software such as *Acta* or *Inspiration* allows one to generate many ideas and quickly organize them in hierarchies of detail. This process enables one to invent concepts by seeing which ideas hang together, and to invent procedures by organizing activities in the optimal order. These concepts and procedures are tested quickly and irrelevant ideas are easily weeded out.

Tasks

Computers are inherently engaging, especially to school-age learners, and can be well used to present a task that invites creativity. Such tasks strike a balance between constraint and open-endedness. They are structured enough to give the learner an interesting starting point and a clear idea of the expected product, and open-ended enough to suggest multiple alternative paths (Gehlbach, 1987).

An example of this use of computers is a story starter in interactive fiction software such as *HyperStories* (Lange & Dodge, 1991). In this case, the first few pages of a story are given up to the point of a branching decision. The learner is invited to write what happens next in the story after a branch is taken, and to continue the story through multiple strands to multiple conclusions. The task, though very open-ended, is constrained by the need to maintain logic and consistency of tone and character.

Possibilities

Ordinarily, creativity requires the learner to generate alternatives from memory. Possibility pools support the creative process by providing a set of alternatives. The task be-

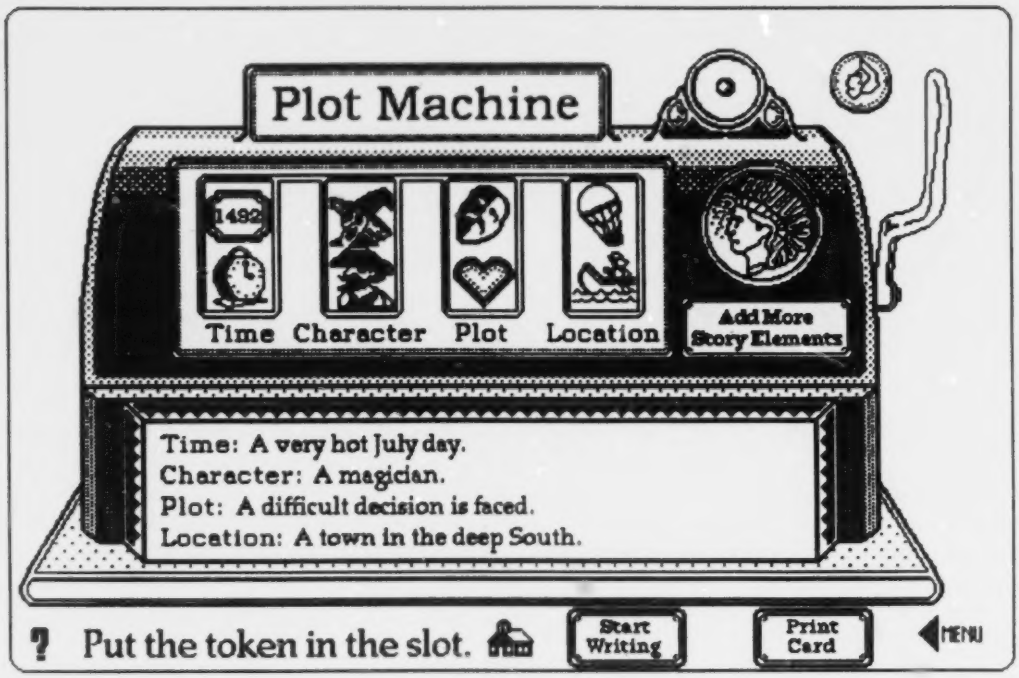


Figure 2. An example of a possibility pool

comes one of choosing from among given alternatives rather than generating them from scratch – a much easier undertaking.

Examples of possibility pools include collections of clip art and digitized sounds and music. For the creation of text, a thesaurus is a possibility pool. To some extent, possibility pools serve a compensatory function, providing images for verbal thinkers and words for visual thinkers. Possibility pools come into use after the problem or task has been at least tentatively defined, and alternative solutions are needed. Possibility pools are often very task specific, such as the rhyming dictionary included in *Michael Newman's Poetry Processor*, which also serves as a tool for trying and revising poetry.

IdeaFisher is a twenty-five megabyte pool of concepts that are linked together in our culture and common experience. In looking up the concept "red", for example, *IdeaFisher* would show related concepts such as "chapped hands," "Red Skelton," "Communist," and "caboose." Giving students access to this pool has been shown to result in the production of more ideas (Watson, 1989). In the hands of an inventive teacher, software of this sort has great potential for helping students to cast their nets more widely in the search for new ideas, particularly in the linguistic domain.

Another example is *Plot Machine*, which randomly generates combinations of story elements (Figure 2). Students can repeatedly pull the handle on the machine until an alternative comes up which seems to fit the problem. As with many examples, this software could fit into more than one category, depending on how it is used. It could be used at the outset of the creative process to generate a task. If the wheels of the machine were stocked with a narrower range of possibilities it could serve as a possibility pool for subplots within a given story. Finally, if the task for a class were to create their own possibility pool for a wide range of stories, *Plot Machine* would qualify as a tool for this activity.

Using simple database management software or hypermedia tools like *HyperCard*, teachers (and students) can put together possibility pools to support the creative process. For example, data bases of writing topics, character descriptions, famous quotations, or physical attributes can be developed. Putting such information in computer form makes it possible to access it quickly and to put disparate elements side by side to suggest new combinations. The larger the number of items in a pool, the more useful it is likely to be.

Conclusion

Computers as tools provide the ideal environment for performing creatively for those who have already mastered a particular domain: skilled writers, gifted artists, etc. Such performers no longer need a stimulus; they find or invent their own challenges. Having mastered a craft, they are less dependent on possibility pools as a source of ideas. The ideal environment for *developing* creativity, on the other hand, includes all three components: tasks, possibility pools, and tools.

The near future is likely to bring us new

forms of creativity-oriented environments. Among these will be intelligent simulation software (Schank & Farrell, 1988) and intelligent mirror software (Schwartz, 1989) of which the *Geometry Supposer* series is a prototype. As more networks of computers are established in schools, software will be developed to allow groups of learners to interact creatively in real time. Writing labs exist in which students communicate with each other via computer and use that as a starting point for writing activities. These provide just a hint of what is to come. Most of the *Education and Ecstasy* vision of a school classroom of the year 2001 will have arrived before the decade is out. There's no need to wait for the millennium, though, as today's technology gives us many things to try.

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Inspiration, Ceres Software.

Michael Newman's Poetry Processor, Newmanware.

Plot Machine. Included in *Educators Home Card*. Apple Computer.

Stella II. High Performance Systems.

What we know here is very little,
but what we are ignorant of
is immense.

Laplace

Technology Resources In Education (TRIE): Opportunities for Collaboration

by Craig Blurton

Hi, my name is Steven Smith and I'm looking for a pen-pal. I'm 10 years old, in the fourth grade and in the gifted program. I like to play soccer and basketball. I program computers and have a Guinea Pig. I would like to meet someone who has the same interests as me and wants to find a pen-pal. When writing to me, please use the subject, "to Steve" so I'll know the letter is for me.

The above message, unremarkable though it may seem, is actually representative of a remarkable new use of technology in education. "Steven" sent this message January 1, 1991, from Pittsburgh, Pennsylvania, by means of electronic mail to a "list server" on an electronic highway known as the Internet. From the list server, Steven's message can be read and responded to by students and teachers across America, in Australia, New Zealand, Europe, and parts of Asia including Japan. Electronic communications is breaking down the physical barriers that separate our students from the rest of the world.

The California Technology Project (CTP) is offering, free of charge, similar opportunities to California educators and students on its Technology Resources In Education (TRIE) electronic information service. California students can exchange information, thoughts, and ideas with other students throughout California, as well as with students in other states and countries. California teachers can use the CTP's services to exchange curriculum materials, participate in professional computer conferences, and access important databanks of information.

Examples of Educational Activities

A few examples may serve to demonstrate how these services might be of use to you and your students:

- Bonnie Price, a teacher in Alhambra, is coordinating an exchange of personal and cultural information between students in Southern California and students in Sao Paulo, Brazil.
- Steven Pinney, a teacher in Orange County, is directing a project named "Kids2Kids." Steven's project involves students in Northern and Southern California who are writing (to the CAPP objectives) and sharing their efforts, via electronic mail, with each other. They cooperatively publish a newsletter of their writings.
- Yvonne Andres, a teacher in Oceanside, is coordinating "Kids Connection," a project in which teachers and students throughout California are using electronic mail to share information pertinent to their social studies curriculum.
- Don Penland, in Sacramento, is keeping rural science teachers in touch and informed of developments in their field using electronic mail and computer conferencing. His project is titled "Science In Rural California (SIRC)."

In addition to these examples of existing projects, there are many other efforts underway. For example, a project has begun to electronically connect students and teachers in Boston, Detroit, Washington D.C., and Los Angeles as part of the Los Angeles County "Star Schools" federal grant. This grant provides mathematics and science instruction to inner city students by means of satellite broadcasting. The CTP will make it possible for these individuals to use electronic mail and computer conferencing to carry on a dialogue beyond the broadcasts. Teachers involved in the middle schools reform effort, with the assistance of the CTP, will have direct electronic access to the California Department of Education's Office of Middle Grades staff to exchange information, successful practices, and model curriculum materials. Students and teachers in 10 countries may be part of an international telecommunications exchange sponsored by the America's Cup Organizing Committee.

The California Technology Project (CTP)

To understand the TRIE electronic services, a bit of background information is necessary. The CTP is a cooperative effort of the California State University system and the California Department of Education. Funded by the

Educational Technology Local Assistance Program (AB1470), the CTP has three major functions—information collection, information dissemination, and staff development.

To fulfill the first function, information collection, the CTP conducts survey research to establish how technology is currently being used in California's schools. The results of this research is available from the CTP office in Seal Beach and from the CTP Assessment Team at CSU Chico.

To fulfill the second function, information dissemination, the CTP shares information about educational technology statewide by both print and electronic media. The CTP publishes a journal, the *CTP Quarterly*, and various brochures, reports, and pamphlets. The CTP also produces three satellite broadcasts annually for California educators, each titled "The CTP Educational Technology Update." As part of its information dissemination efforts, the CTP also operates the Technology Resources In Education (TRIE) electronic information service which is the focus of this article.

To fulfill its third major function, staff development, the CTP coordinates the work of 14 regional staff development consortia. These consortia, comprised of representatives from county offices of education, school districts, institutions of higher education, and business and industry, meet regularly to plan and conduct technology-focused staff development activities for teachers and adminstrators in their regions.

The Technology

Without going into too much technical detail, the TRIE electronic information service is available on CSUNet. CSUNet is an electronic network that connects the 20 CSU campuses, the CSU Chancellor's Office in Long Beach and the SouthWestern Regional Laboratory (SWRL) facility in Seal Beach. Think of it as a "highway" over which flows information. Each of these locations have public access telephone numbers so that educators may, using a personal computer, modem, and appropriate telecommunications software, connect with CSUNet and then TRIE.

TRIE, the electronic service provided by the CTP, is located on a "host" computer at SWRL in Seal Beach. If CSUNet can be thought of as a highway, then TRIE is but one possible stop on the highway. Many other computers ("stops") are also on the CSUNet highway, but most are restricted to use by CSU faculty and students. There is no charge for accessing either CSUNet or TRIE.

CSUNet is also connected to the Internet. The Internet is a collection of interconnected computer networks that span the globe. It is estimated (because nobody knows for certain) that over 100,000 computers are on the Internet (not including individual workstations that can access the network through their local "node") and that over 500,000 people make use of the Internet daily.

Although the local and regional networks that comprise the Internet were originally developed for the use of the military, government, and academia, there is a movement afoot to expand and improve the network and to create a national kindergarten through higher education electronic information highway. Sponsored by the National Science Foundation, this effort has tentatively been named the National Research and Education Network (NREN).

In California, the California Technology Project (CTP) is taking leadership responsibility for bringing K-12 educators and students free electronic information services. TRIE is our major effort and includes, as mentioned earlier, electronic mail, computer conferencing, bulletin boards, and on-line databases.

Opportunities for Collaboration

So, how might you as a teacher of the gifted and talented make use of TRIE? Here are but a few suggestions:

- Using electronic mail, your students could exchange information relevant to their educational needs with students in other parts of California, other states, and other countries.
- Using electronic mail and computer conferencing, you could exchange ideas and materials with teachers of the gifted and talented in other parts of California, other states, and other countries.
- Using electronic mail and computer conferencing, you can communicate directly with staff at the California Department of Education's Office of Special Programs: Gifted and Talented Education to exchange ideas and materials or ask questions about educational policy.
- Using the bulletin board section of TRIE, you can access information about educational programs and policy posted by the

California Department of Education, and other organizations.

- Using the databases on TRIE, you can search for appropriate software and videotape materials to support instruction in your classroom, or search the Melvyl system to locate a book at a University of California campus near you. The CTP will be making the ERIC database available on-line this year.
- Using electronic mail, your students can communicate with a university professor who specializes in a topic they are studying.

What Do I Do To Get Started?

To make use of the services on TRIE, you will need to have a personal computer, modem, and telecommunications software. If you have these items, and previous experience with telecommunications (or an adventurous spirit), follow the directions below to connect with TRIE:

1. Set your modem to 7-1-E.
2. Dial into the nearest public access port (the numbers are listed at the end of this article).
3. After receiving a message like "1200 Baud access" press return.
4. At the "PAD>" prompt, enter "c .swrl/33" (in lower case letters and without the quotation marks) and press return.
5. At the "login:" prompt enter "ctp" (in lower case letters and without the quotation marks) and press return.
6. At the "Main Menu," follow the directions to request an account.

Your password will be mailed to you within 3-5 working days, after which you will be able to access all of the TRIE services.

Although TRIE has been designed to be as simple to use as possible, you may need some instruction and support in accessing the network. The CTP consortia offer telecommunications workshops to educators. In addition, the CTP office in Seal Beach offers help during regular working hours. For a list of the consortia and their telephone numbers or to request help accessing TRIE call the CTP office at 1-800-272-TRIE or 213/985-9631.

Other Opportunities

The CTP has a number of existing projects that you may wish to become involved in on TRIE. Beyond these projects, the CTP is interested in working with educators who wish to create and moderate new computer conferences, and who wish to start new exchange programs between students in diverse geographical locations. If you have previous experience with telecommunications, and would like to take a leadership role in promoting the uses of telecommunications in support of the education of gifted and talented students, send an E-mail message to "cblurton" on TRIE. Please describe your background, current interests, and ideas for making use of telecommunications with gifted and talented students and teachers.

CSUNet Public Access Telephone Numbers:

Chancellor's Office	213/590-5254
SWRL	213/985-9540
Bakersfield	805/664-0551
Chico	916/894-3033
Dominguez Hills	213/769-1892
Fresno	209/278-7366
Fullerton	714/526-0334
Hayward	415/727-1841
Humboldt	707/822-6205
Long Beach	213/494-1213
Los Angeles	213/225-6028
Northridge	818/701-0478
Pomona	714/595-3779
Sacramento	916/737-0955
San Bernardino	714/880-8833
San Diego	619/594-6309
San Francisco	415/333-1077
San Jose	409/924-1054
San Luis Obispo	805/549-9721
Sonoma	707/664-8093
Stanislaus	209/632-7522

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Wherever they burn books
they will also, in the end,
burn human beings
Heinrich Heine

Increasing Educational Options through Distance Learning

by Robert Threlkeld

In early December, 1990, the Los Angeles Times reported that the 1970's population boom in rural America was over. Preliminary U.S. census figures showed that more than half of the nation's rural counties had lost population in the last decade, continuing a downward trend that began at the turn of the century. While California's 27 rural counties did not lose residents, no substantial growth occurred.

Rural Californians concerned about public schools didn't need to wait for the numbers. Difficult economic times and a declining tax base coupled with teacher shortages and rising school costs persist in making quality education tough to achieve in sparsely populated regions. Often parents and administrators are disheartened about the prospects of bright high school graduates who enroll in the state's premier universities, knowing that the students have not had the breadth of courses needed to succeed.

However, the use of communication technologies can offer some assistance to rural schools. Grouped loosely under the term "distance learning," various technologies can bring small groups of students together to form classrooms without walls, allowing a single teacher to reach students simultaneously at several sites.

Editor's Note: Though Dr. Threlkeld's article deals primarily with distance learning for rural areas, the same concept applies anywhere there may be a scarcity of teachers or a low density of students. Thus, diverse and esoteric course options may be offered to small numbers of academically talented students through distance learning in urban, suburban, or rural settings.

Satellites and Telephone Lines

There are two major communication transmission technologies utilized in distance learning: satellite broadcasting and land-based telephone or microwave networks. For most educators, as well as the public at large, the term distance learning is synonymous with "satellite." Visions of the space shuttle, extra terrestrial vehicles, and global communications have caught the public's attention. Now a charismatic instructor can teach German to 2,000 high school students, reaching schools which are tucked into remote nooks and crannies in rural America.

The satellite business is enormously seductive for distance learning producers. Although the initial hardware and ongoing transmission costs are high, once paid, transmissions can go anywhere. Satellite broadcasts to five students are the same as to five thousand. Marshall McLuhan's global village has become a reality.

The satellite distance learning phenomenon is off to a quick start. The Texas-based TIIN Network and Oklahoma State's ASTS broadcast sophisticated interactive high school classes to students around the country. Several dozen California schools subscribe to these services. Students do well, and seem to like the experience of a satellite television teacher. Other small regional or statewide systems, using a mix of satellite and other technologies, are springing up in places like Missouri, Oregon, Virginia, and Iowa. Injections of capital from the 1988 Star Schools legislation have helped to support these systems. In the second round of Star Schools funds, Los Angeles County's Office of Education recently received several million dollars to provide by satellite a wide variety of programs to schools throughout California and the nation.

While the public has focused on satellite instructors reaching students in many states, some of the most intriguing developments in distance learning have been occurring in rural areas, particularly in the Midwest. The most pervasive communication network in the United States remains the telephone system. Telephone lines are everywhere and have been used for years for distance education. Also, realizing the potential volume of usage, the various telephone companies are now showing strong interest in increased educational usage of their networks.

Conference call-type educational networks have been used for instruction for at least 30 years, and still serve a large share of the distance-learning population. Until recently, because of the limited bandwidth of phone lines, only audio or rudimentary graphics could be transmitted over the network. While sound and still graphics are perfectly adequate for most types of instruction, students want video, and preferably two-way video.

Developments in fiber optics and a technology known as "video compression" have

increased the capabilities of the telephone network, and are providing an alternative to satellites. In most instances, neither of these technologies are currently cost competitive with satellites. However, as opposed to satellite technology, costs for both video compression and fiber optics continue to decline.

Exemplary land-based distance learning programs

The Oklahoma panhandle is one of the nation's most rural regions, characterized by large land areas and few people. Beaver County has four school districts within a 1200 square-mile area. The total student population in the county is about 1100. The educational problems of the county are typical of those described by Dede (1989): "problems of scale (not enough students in a single location) and rarity (an instructional specialty not locally available)."

In 1988 these districts began to supplement their curriculum with courses transmitted over a two-way video fiber optic network. The network was created through a cooperative effort of the school districts and the local co-op telephone company. The total start-up cost of the system was $340,000. During its first year of operation, the network offered four courses, each originating from one of the network schools and shared by all others.

In September, 1989, California State University at Bakersfield began a similar pilot program of transmitting two-way video, voice, and data to Tehachapi High School, located in the mountains 50 miles south of the University. The University delivers undergraduate courses to advanced high school students through a special fee-waiver program.

According to the University (Taylor, Sanford and Brynjulson, 1990), the program is being well received by the students. Interestingly, these authors believe that students are more comfortable with telephone-based technology than with any other medium. Also, they appreciate that the classes provide for two-way interaction between students and instructors.

The Bakersfield project was funded through a series of grants from Pacific Bell and other sources. Video is transmitted over special high-capacity telephone lines, using state-of-the-art video compression devices. Although not currently cost effective, this model demonstrates an effective public-private partnership to meet educational needs created by isolation and distance.

What makes these examples particularly attractive is their use of local educational resources. The teacher of record and the acknowledged "expert" are within the region, no more than 50 miles away. In addition, the limited number of sites, the two-way video, and small class sizes assure that the educational experience is personal and involving. Television in this instance is not a mass medium, but a tool to allow a teacher to be in several places at once. As Roberts (1989) notes, these networks "offer a way to expand resources for the districts yet maintain local control of curriculum, assure high-quality instruction, and keep the local school/community identity intact."

Research results on distance learning are quite encouraging. Historically, studies have shown that the type of educational medium (including face-to-face instruction) has little effect on learning outcomes. If there are any differences, distant students seem to outperform their on-campus counterparts. What does seem to matter more than media is the quality of the instruction and student motivation. A good summary of comparative research is cited at the end of this article.

What does this all mean for rural California schools? For regions where the sharing of local instructors is viable, there is some likelihood that technology-based consortia could be created. Karen and Will Kitchen (1988) provide a detailed look at local cooperative planning. While the costs for regional networks are dependent on each specific location, local telephone companies (including Pacific Bell and GTE) seem quite amenable to discussing options. Although California has limited experience in telephone-based regional networks, a number of Midwestern states (Minnesota, Iowa, Kansas) have been involved in this form of distance learning for years.

Where can one find out about distance learning opportunities? The Los Angeles-based instructional television agency, RETAC, acts as a distance learning informational source in the state and can provide help in connecting with satellite programs. A number of useful publications have recently appeared. Listed at the end of this article, these can act as primers to parents and administrators who want to consider distance learning at their schools.

In sum, rural living need not mean a constricted, second-class education. Rural students who have taken German over satellite often

score very high on college entry exams. Physics is now being taught in tiny schools which had previously dropped the course because no teachers were available. Small school districts are sharing one skilled teacher with other districts, generating workable class sizes. Distance learning can help provide equality in education, regardless of where a student lives.

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* *Useful general publications on distance learning.*

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THE BOOKSHELF

Light Bright, A Bright Idea for Bright Minds in the Primary Grades

Joyce L. Martin
Portside Publishing Company
P.O. Box 251
Port Angeles, WA 98362

This is a delightful spiral bound book of "activity centered" ideas for primary grades. The book is divided into three focal areas. The first is exploratory baskets. These are activities which can be built in baskets or tubs for "center" organization. The activities cover a wide range of subject areas and concentrate on higher-level thinking skills à la Bloom. Suggestions for time, space, and teacher management are well thought out and practical. Generic forms are provided which would make the program easy to apply.

The creative teaching section is a sample resource notebook utilizing the "volunteer teacher." The section is a resource and record keeping system for building parent volunteers and their skills into the organizational format of a GATE program. While theme or content may overlap the "basket activity" portion of the program, this section of the book is intended to assist teachers in providing another opportunity for their students to interact with volunteer teachers.

The final phase of the Light Bright program deals with broadening the volunteer base by using mentors and community resources.

The format presented in this book would help a classroom teacher with a cluster of GATE students build a thinking skills program around centers, and utilize parent and community mentors. It is an excellent organizational tool with enough "start-up ideas" to get a program started.

For teachers with a program in place already, there are sufficient ideas, useful forms, and reference lists to make this a useful addition to their GATE library.

Reviewed by Pennie Saletta, Mount Shasta Region Educator Representative, GATE Coordinator Happy Valley and Pacheco USD

Technology, the Gifted, and the Language Arts

by Stephen Marcus

Computers give students new powers and incentives. By allowing the creation of "documents" that combine text with sound, animation, graphics, and video, the technology expands students' opportunities to become information artists, architects of knowledge. And knowledge, we're reminded by computer-graphics specialist Aaron Marcus, "is know-business, and in know-business, there's no business like *show* business." Multimedia technologies, including laser video and CD ROM discs, provide extraordinary opportunities for students to show what they know — and feel. The expressive repertoire of students is enormously enriched by these high-tech resources, which add new and wonderful dimensions to the term "language arts."

For gifted students and their teachers, the somewhat dizzying array of new technologies can produce a kind of techno-vertigo, drawing us all into a whirling world that hardly seems to stay defined long enough for us to master the basics, let alone the whistles and bells that keep getting added to that with which we've struggled to become familiar. And to make matters even more confusing, by the time the technology really works, suggests UC Irvine's Al Bork, it's obsolete.

That's the bad news. The good news is that successful teachers have provided numerous models for using technology to support and enrich traditional instructional goals and for rethinking the means for achieving those goals. I might also mention here the Hanlon-Campbell Law of Program Design (see the discussion of The Grapevine Project, below), which states: "Given more than one attractive alternative, choose them all." We really do have an embarrassment of riches, so let's make the most of them.

In addition, while hardware and software are clearly major concerns here, it's the "neural wetware" (our brains) that is the primary resource. The "operating systems" of both hemispheres are what enable both gifted students and their teachers to attend to the details of the technology and to the larger picture, the possibilities for refining and extending the usual approaches to incorporating technology into the curriculum.

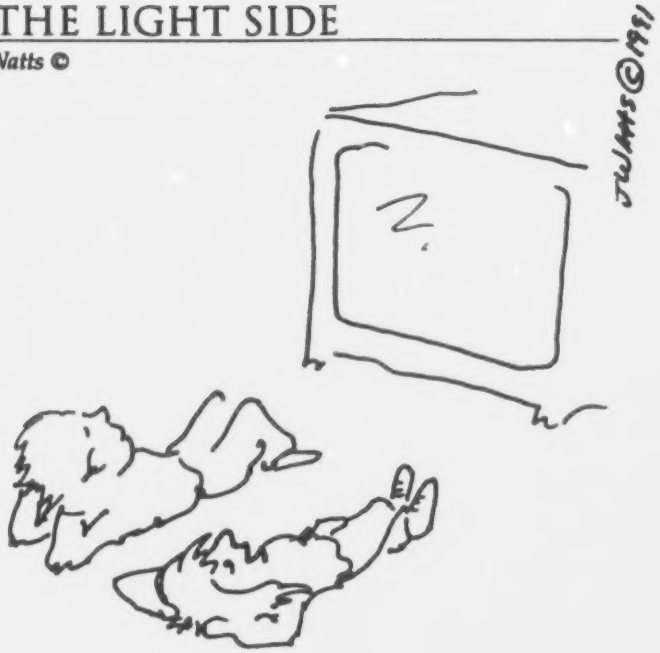
Here's one simple example: it's called "invisible writing with a computer." When students are first trying to get their thoughts into words using a word processor, they can turn the monitor's brightness or contrast knob down so they can't see their evolving texts. After typing for a short time, they can turn the monitors back up, examine what they've said, and continue to compose visibly or invisibly. After practicing this method, students report that the technique frees them from the compulsion to fix typos and do other premature editing that interferes with the composing process. They're better able to concentrate on what they're thinking about, what they say comes more from their subconscious, and they're more interested in seeing what they have to say. (For a more extensive description of this research, see "Not Seeing is Relieving: Invisible Writing with a Computer," S. Marcus and S. Blau, *Educational Technology*, April 1983. For a more recent discussion, see the author's chapter in *Lesson Plans for the Computer Age*, Wm. Wresch (ed.), (in press) National Council of Teachers of English.)

Here's a more complex example, involving the artificial intelligence program *A.I.* (available from Scholastic, Inc.). With this program, students can design a variety of games, decide what "winning" means, teach the games to the computer, play them with the computer, and watch the computer become better at playing them than the people who designed them. The program uses memory, knowledge acquisition, induction, searching, and pattern matching. It also displays aspects of "foresight."

One interesting application here is to have a group of students in one room design and play the games, but with the "adversaries" placed in two other rooms. In one of these other rooms is a group of students running the *A.I.* program. They're merely following the written directions given by a messenger shuttling between the rooms, who is carrying responses back to the game-designers. In a third room is a group of students who use their real intelli-

ON THE LIGHT SIDE

by Jean Watts ©



Hype, non complex..Inflexible but with closure... Yes, perfect for vegging.

gence to follow the directions provided by the messenger. These students are also trying to counter the game-designers' moves in order to win the game.

Can the students who are designing the game tell which room has the computer in it, i.e., which adversary is using real intelligence and which is using artificial intelligence? If they can't, then the program has passed the Turing Test for erasing the line between artificial and real intelligence.

Students can be challenged to articulate the nature of "intelligence" and to describe ways that *A.I* does and doesn't fit their definitions. Further discussions can explore what kinds of intelligence it takes, for example, to write a novel — and to read a novel. How do writing and reading depend on the dimensions of intelligence that *A.I.* uses (memory, induction, foresight, etc.)? And to what extent does this whole discussion, to borrow Sherry Turkle's words, "fascinate, disturb equanimity, and precipitate thought"?

The *A.I.* program was not designed to stimulate discussions of what it takes to write a novel, but it provides an interesting opportunity to do so. This is an example of the kind of adapting of software from one context to another that is at the heart of the Higher Order Thinking Skills (HOTS) project. (The *A.I.* example was not taken from the HOTS curriculum and should not be taken to be representative of it.) Those readers familiar with HOTS may well wonder why I'm including it here, since it was originally developed and is perhaps best known for its use with "at-risk" and Chapter 1 students.

The HOTS program, as described by its originator, Stanley Pogrow, was designed to develop four general thinking skills: metacognition, inference, decontextualization, and synthesis. Teachers are trained to "maintain proper levels of ambiguity in discussions so that students would have to resolve ambiguity, construct meaning, and articulate complete ideas and strategies." Pogrow suggests that "HOTS may be the first program designed for Chapter 1 students that has been adopted for gifted students." (For information about HOTS, write Stanley Pogrow, College of Education, University of Arizona, Tucson, AZ 85721.)

One of the special features of the HOTS program is that it applies its general techniques to a wide variety of computer software — programs that weren't necessarily designed with the HOTS goals in mind. This is a particularly noteworthy approach. It encourages us (and our students) to reconsider the materials we have at hand, to see how they are more than we imagined, to make the familiar strange (and the strange familiar). Talented California educators have been applying the HOTS program at a variety of grade levels. (Those interested in a middle school environment, for example, can write Dr. William Younglove, Lindbergh Middle School, 1022 E. Market Street, Long Beach, CA 90805.)

A different kind of project, one that features telecommunications technology, is *kids2kids*, which currently involves some 3000 students and their teachers throughout California. Students work on long-term writing projects throughout the year, communicating with other students in paired classrooms at distant locations (including those from around the U.S. and in other countries.)

As described by its director, Steven Pinney, "*kids2kids* is run by teacher/consultants who create and present lessons designed to challenge students to produce their best thinking/writing. By providing a *real* purpose for writing and a *real* audience, the *kids2kids* network exempli-

fies the spirit of the California Language Arts Framework." Students take on writing projects that are consonant with California Assessment Program writing categories and with the missions of the California Writing Project and Literature Project. Their work is published in "hardcopy" anthologies as well as on the network's system. (For information, write Steven Pinney at *kids2kids*, The Writing Center Rm. 24, 3224 California Street, Costa Mesa, CA 92626.)

As a final example, I'll mention the work done by Pat Hanlon and Bill Campbell, the former an English teacher, the latter a school librarian (now retired). They are well-known in connection with The Grapevine Project, one of the first extensive computer-based multimedia environments for studying literature (specifically, *The Grapes of Wrath*.) They were among the first to incorporate computers, laserdiscs, text, images, and graphics into a "hypermedia" environment, one in which each information source was extended and connected to others. In their words, "If a library is to be something more than a room where books are standing up instead of lying down as they are in a textbook room, then it is a place where connections — paths leading from one thing to another — can be discovered and pursued. The catalog and indexes let learners follow these leads now, in a rudimentary way, but the computer will expand that power beyond our ability to imagine it. Until now, libraries have hung together like a wired-together skeleton of a brontosaurus. They are about to acquire a nervous system." (For information, write Pat Hanlon, Lowell High School, 1101 Eucalyptus Drive, San Francisco, CA 94132.)

In the November 1990 issue of the *Communicator*, Barbara Brandes reported that current educational reforms are consonant with the goals of education for the gifted. These include an emphasis on problem-solving and reasoning skills, the encouragement of creativity, the use of long-term projects, recognition of "artistic intelligence," and collaborative solving of complex problems. The very brief descriptions above of technology-related efforts should indicate that there are ample models for incorporating technology into the curriculum, models that are exactly in tune with the mission of education for the gifted.

To nurture, direct, and disseminate the best of current practice, it's helpful to have some guidelines for supporting innovation, since new methods, attitudes, and technologies are often much harder to sustain than to introduce. Here are a few suggestions, based in part on the working assumptions of the California Writing Project/California Technology Project Alliance.

- Teachers from different disciplines and different grade levels have much to teach each other about how technology can be used creatively.
- Practicing technology-using teachers provide the best source of expertise on what actually works in a classroom, and they make the best teachers of other teachers.
- The best teachers keep in touch with new developments in their own fields and in educational technology. They need to, in order to acquire, exercise, and justify their influence on decisions affecting the use of technology in their schools.
- Teachers can advance the field significantly by conducting classroom-based research and by publishing their teaching ideas.
- Administrative support is crucial to ensure continued inservice training and to encourage educators to brave the risks that innovation always entails.
- Students have much to teach us all about the potential for technology in education.

New and increasingly powerful technologies are both enhancing and transforming gifted students' already remarkable potential. While the future benefits of educational technology depend to a great extent on the companies that create the tools, they derive even more from the people who create *using* the tools. The vitality of technology-enriched curricula still depends on talented teachers who acquire an informed exuberance. They will continue to be a major force in making the most of what the technology and their students offer them.

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An Open Letter to Parents of Students

by David Moursund

The International Society for Technology in Education (ISTE) is a non-profit professional society of educators working to improve our educational system. The following article is an expanded version of an Editor's Message that appeared in the October 1990 issue of The Computing Teacher, which is a publication of ISTE. The Computing Teacher editorials for the 1990-91 publication year consist of a sequence of letters to the stakeholders who should be most concerned about use of computers in schools. These include students, parents and taxpayers, teachers, curriculum leaders, school administrators, business people, teacher educators, and state and federal government officials.

Dear Parent:

Probably you have seen television reports and read articles that say our schools aren't doing too well. These reports are correct. Our children aren't getting nearly as good an education as we would like. This is especially true when it comes to learning how to use computers.

When I was a student, we didn't have computers in my grade school or high school. The computers that existed in those days were big, expensive, and hard to use. Probably this was also true while you were in school.

However, the world has changed a lot since then. Now, computers are much better, cheaper, and readily available. Now, millions of people have computers on their desks at work and/or for use at home. Now, computers are built into most of the new machinery being installed in offices, stores, and factories. Children have toys, such as Nintendo, that contain powerful computers.

In my personal experience giving workshops, I have found school districts in which well over half of the students have good access to computers at home. Many of these students have parents who role-model appropriate use of computers as aids to accomplishing adult tasks. These school districts tend to be the ones that also provide students with good computer access in the schools. In other school districts students have relatively poor computer access, both at home and at school. Clearly this country faces a major equity issue in terms of computer access for educational purposes.

Now we come to the real purpose of this letter. The chances are that your children are not learning much about computers in schools. "Not true," you say. "I know that my kids have used a computer at school." The trouble is, there is a good chance that they aren't learning creative uses of computers as aids to solving problems in all subjects. They aren't learning to make routine use of computers as tools for thinking. The computer facilities which they are using are apt to be terribly out of date.

Let me ask a hard question. Why do we consider reading, writing, and arithmetic to be the "basics" of education? Think about some answers before you read the next paragraph.

Reading, writing, and arithmetic are the basics of education because they are aids to the human mind. They help the human mind to store and process information. They help the human mind to solve hard problems. Every person can benefit from knowing how to read, write, do arithmetic, and use these mind tools to help solve problems.

Now a new mind tool has been invented. It is an important addition to reading, writing, and arithmetic. The trouble is, most of our schools are doing a very poor job in helping students learn to use this new mind tool. It is easy to see why. Most teachers are like you and me – they did not learn to use computers while they were in school. Most textbooks do not assume that students have good access to computers. Most tests do not allow students to use computers. Most students do not have very good access to computers.

Think about the last sentence for a minute. Pencil and paper are very important mind tools. You would be very unhappy if your children did not have easy access to pencil and paper throughout the school day and as they did homework at night. For millions of adults, the computer is now equally important. They would not think of attempting to do their work without having a computer readily available. This will be even more true by the time your children become adults.

Most of our schools do not have nearly enough computer equipment to allow students to use computers whenever it would be appropriate. Most of our teachers lack the training that would prepare them to take advantage of having many computers in their classrooms. Many of our schools still stress rote learning, rather than learning for understanding and for problem solving. Most of the curricular materials the teachers and students use are not appropriate for use in a computer-rich classroom environment.

Eventually all of this will change. Ten or twenty years from now most students will have easy access to computers. Every teacher will know how to work in a school setting where there are lots of computers. Students will be allowed to use computers when they take tests. (Why not? Adult workers are allowed to use computers when they are faced by the test of solving the real world problems they encounter on the job.)

Unfortunately, that will be too late for your children. There are some things you can do about this. It may be that you can create a home environment in which computers are routinely used to assist in problem solving and tasks which require higher-level thinking. If you have the knowledge, skills, and money, then this is a very good thing to do. Another possible approach is to work with some other parents so that together you accomplish this task.

In any event you will also want to work on improving the quantity and quality of computer use in your child's school. Even a very few concerned parents can cause a major change in a school. They can cause this change by making their wishes clearly known to teachers, school administrators, and the school board. Here are some of the kinds of questions to ask:

1. Are your children learning to use a computer to solve hard problems in all different subject areas, or are they mainly using computers to help memorize simple facts? A good quality modern education stresses higher-order cognitive skills and the use of appropriate technology to aid in solving problems.
2. Do the teachers feel comfortable in routinely using computers for their own work and with their students? Do they routinely role model appropriate use of computers?
3. Do students get to use calculators and computers when taking tests? If not, why not? Is the school experimenting with this idea, moving rapidly toward a time when it will be routine for students to make use of such technology when they are being assessed?
4. Do students have to leave their classrooms and go to a lab to use computers? If so, they cannot make routine, easy, everyday use of computers. Teachers cannot integrate their routine use into the curriculum. What are the school and district plans to make computers readily available for routine, everyday use by all students?
5. Does the school have a computer coordinator or technology facilitator with substantial release time from teaching duties who has the job of helping teachers use computers in their everyday teaching? Substantial research points to the need to provide such help to teachers if they are going to make good progress in integrating computer use into their teaching.

Computers are a powerful aid to the human mind. However, it is still very important that students learn reading, writing, arithmetic, and problem solving. All of these ideas and tools should be integrated together and used throughout the school day by both students and teachers. The results will be an improved educational system.

Let me know about the progress you make in working to improve the education of your children. Please write.

Sincerely yours,

David Moursund, Executive Officer
International Society for Technology in Education
1787 Agate Street
Eugene, Oregon 97403

Books are delightful society.
If you go into a room filled with
books, even without taking them
down from their shelves,
they seem to speak to you,
to welcome you.

William E. Gladstone

Vision: Technologically Enriched School of Tomorrow (TEST)*

by Gary G. Bitter

** This represents the recommendations and visions of the Final Report prepared by ISTE under a grant from the IBM Educational Systems.*

The International Society for Technology in Education (ISTE) realizes that there exists no single, simple solution to our educational ills. However, there are many examples in current classrooms of dramatic successes when students and teachers are provided with easy access to technology. Careful study of these successes reveals that technology enables well-trained teachers to provide their students with superior learning experiences. The use of technology

- permits teachers to assume new roles in the creation of learning opportunities for their students,
- encourages individualization of learning experiences to accommodate various learning styles,
- allows learning experiences far beyond anything available otherwise,
- provides strong motivation for students, and
- reduces time-consuming paperwork and allows teachers more time to take advantage of the opportunities for technology.

How can we effectively implement technology in the learning environment? The International Society for Technology in Education reveals five major recommendations and twenty-three vision statements. These are intended as a launching point for educators.

Recommendations for Educational Decision Makers

Recommendation 1

As a nation, the United States must recognize the need for improvement in its educational system and seize the opportunities offered by technology.

Visions:

- We urge the President to declare the 1990's as **The Decade of Technology in Education.**
- We urge the Congress to enact legislation that substantially increases support for research and development efforts in applications of technology in education. This legislation must support development of new assessment techniques to reflect the new learning that technology encourages. This legislation must support improvements in teacher education programs, at both preservice and inservice levels.
- We propose that a National Technology Trust Fund analogous to the National Highway Trust Fund be established. The Fund will use its revenues to ensure that no student is denied access to needed technology because that student resides in a community with an inadequate local tax base, and to support studies of the efficacy of educational technology.

Recommendation 2

As a nation, the United States must provide every student with the opportunity to become what each is capable of becoming. It must provide an environment for each student that is conducive to learning.

Visions:

- **Equity** – Students in the United States must be guaranteed access to educational technology in their educational program whenever needed without regard to gender, race, ethnicity, socio-economic status, mental or physical limitations, geographic location, or national origin.
- **Curriculum** – In order to permit our students and teachers to take maximum advantage of technology, the curriculum must change in major ways. Technology must be integrated into the curriculum, rather than being a supplement to the curriculum.
- **Assessment** – Because educational technology opens new worlds of learning, permits development of higher-order thinking skills, and supports a wide variety of learning styles, new assessment techniques that reflect the new skills and the new learning environments must be developed to supplement and finally to replace conventional tests.
- **Learning Environments** – The learning environment should include access to a wide range of technologies and to the entire world of information. It should offer opportuni-

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ties for creativity, critical thinking, information access and manipulation, communication, and multisensory stimulation.

- **At-Risk Students** – There should be a strong national focus on using technology to reduce substantially the number of at-risk students who drop out of school.
- **Student/Computer Ratio** – By the year 2000, all students should have continuous access to a wide range of technologies.

Recommendation 3

As a nation, the United States must empower all teachers to provide the best education for every student in their classes.

Visions:

- A computer on every teacher's desk
- A computer in the home of every teacher
- A telephone and modem in every classroom
- Teacher Support – Every teacher must have direct classroom support related to the uses of educational technology.
- Continuing Professional Development of Teachers – There must be easy access to and strong support for the continued professional development of teachers.
- Preservice Teacher Education – Teacher education programs must be designed to prepare their students to move into classrooms with rich, technological support. Federal and state subsidies should be provided to establish these programs and attract the best and brightest into these programs.

Recommendation 4

As a nation, the United States must redesign its school systems to prepare its students for the 21st century.

Visions:

- **Restructuring** – Only by restructuring education through the applications of technology can we as a nation achieve the educational manifesto that we all hold for our children.
- **School-Industry Alliances** – Because industry has a direct interest in students and technology, we encourage school-industry alliances in a variety of forms.
- **Communications** – A national educational computer-communications network must be established to connect all levels of education with all facets of society. This would permit collaboration among educational fields and allow ready access to information sources and expertise in the world community.
- **Distance Learning** – Distance learning should be encouraged to provide teachers and students greatly enriched educational options while eliminating barriers of time, geography, physical limitations, and lack of local expertise.
- **Investment in Technology Equipment** – School districts should plan their technology funding on a replacement cycle of no more than 5-6 years. This will ensure that their students and teachers have access to modern equipment that takes advantage of recent technological developments.

Recommendation 5

As a nation, the United States must ensure that schools are managed effectively.

Visions:

- **Student Services** – Administrative student support services must be automated.
- **Curriculum Management** – Technological solutions should be used to facilitate curriculum integration and monitor achievement for all students.
- **Business Practices** – Effective workplace technologies must be used to support school business operations.

Conclusion

Research undertaken by the International Society for Technology in Education (ISTE) indicates that our schools can be substantially improved through an appropriate restructuring process. This restructuring involving technology can reduce drop-outs, increase basic skills, increase higher-order cognitive skills, and better prepare students to become productive adult citizens in our rapidly changing society. The major conclusions are:

- Technology can help well-trained and well-equipped teachers to develop the intellectual potential of all their students.
- Technology in the hands of trained teachers is especially powerful when used with at-risk students.
- Teachers are the key to success in any educational change. They must be trained in the change. They must be supported in implementing that change. They must be provided with adequate resources to create the change.

ISTE pledges to lead the effort for implementing these recommendations in cooperation with other organizations, agencies, and the private sector.

These recommendations developed by ISTE as part of its VISION: TEST project provide solutions so that all students can achieve at levels beyond anything possible in conventional classrooms.

For Further Information

The VISION: TEST Project has prepared two major reports – one is a set of video tapes which focus on several aspects of the introduction of technology into school environments; the other is a more conventional paper report. The purpose of these reports is to assist the nation's educational decision makers in their preparation of designs for restructured educational systems across the country, as they respond to the call of the President and the Governors for a return to pre-eminence for the United States by the turn of the century. For information on how to obtain copies of these reports, or for additional information on VISION: TEST, please contact ISTE and ask for VISION: TEST publication list at (503) 346-4414, or write ISTE at 1787 Agate Street, Eugene, OR 97403-9905.

Alternatives to Integrated Instructional Systems

by Peter Kelman

excerpted from a paper given at the National Educational Computing Conference in Nashville TN, and appears in its entirety in the 1990 NECC Proceedings

At the core of the recent popularity of Integrated Instructional Systems (IISs) is the conviction among politicians, business leaders, various commissions, and educators that our present educational strategies are not working for that considerable segment of the school population regarded as "at-risk." However, while there is little disagreement that our educational system is facing problems of unprecedented proportions, many of us are not convinced that offering so-called "at-risk" students a steady diet of IIS no-fail, "instant education bytes" will either whet their appetites for learning or develop their minds in ways that will assure them, or our nation, of future success.

This paper will strongly criticize Integrated Instructional Systems as being an inappropriate use of computers with students at risk, as well as being wasteful of limited computer resources in schools. It will further criticize the top-down manner in which these systems are being implemented in many school districts. It will then propose alternative models of computer-facilitated education for all students, including those at risk.

The IIS Phenomenon

A careful analysis of confidential sales figures from the educational computing industry suggests that school spending on computer software and hardware has more than doubled over the past two years. Moreover, these figures show that this increase is due primarily to the purchase by cities and large school districts of comprehensive computer-managed instructional systems, commonly known as Integrated Learning Systems.* This analysis also reveals the fact that the funding for these purchases often comes from a variety of federal programs aimed at so-called "children at risk." It would appear that IIS-related purchases for 1990 exceeded half a billion dollars.

Although there is considerable variation in curriculum focus, pedagogy, and age-range served among the various IISs, it is clear from private discussions with both buyers and sellers of IISs that their fundamental appeal to school administrators is the provision, in most cases, of a computer-managed comprehensive basic skills training program for at-risk students that is run largely as a pull-out program in which every child spends 45 minutes to an hour every day; a plethora of accountability-oriented computer-generated reports for each child, class, school, etc.; a single vendor for purchasing, technical support, and staff training; and even assistance with funding the purchase through arranged financing and/or help in drawing up politically attractive bond issue proposals.

While representatives of the various IIS companies will undoubtedly claim that one or another of the characteristics just cited does not apply to their product, this overall description of their appeal to district administrators remains accurate. This can be ascertained by analyzing where the majority of IIS installations are (elementary schools in districts that emphasize central decision-making, accountability, and uniform coverage of mandated curricula) and observing how they are used (primarily to teach basic math and language arts skills). (Software Publishers Association, 1990)

Some Lessons from the History of Integrated Instructional Systems

Many of us who have been involved in educational reform efforts over the past 25 years and in educational computing for the past ten years, are painfully aware of the dangers of the kind of quick-fix technological solutions for complex educational problems represented by the current generation of Integrated Instructional Systems and their forerunners, mainframe-based Computer-Assisted Instruction (CAI). We are particularly wary of such technological fixes being applied to those children who most need a quality education. Thus, we are troubled by the rate at which many big-city and large-district administrators appear to be rushing to spend enormous amounts of money on IISs, despite these systems' narrow focus on rudimentary basic skills, which in isolation are unlikely to prepare students for real success in life.

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* *Integrated Learning System is a somewhat misleading term under which some of these systems are marketed in an attempt to focus the customer's attention on the learning that is supposed to occur when they are used. EPIE, in its study of these systems, argues persuasively that it is more accurate to call them Integrated Instructional Systems, since "they do not possess the level of learner-adaptiveness and other features that education's yet-to-be-developed computer-assisted learning systems will one day possess." (p i.1, Sherry, 1990) For the remainder of this paper, we will use the term Integrated Instructional Systems or IISs.*

Further, many of us who are advocates of educational computing worry that the current enthusiasm for IISs will soon turn to disillusionment, to the detriment of all educational computing. This is precisely what occurred in the late 1960s and early 1970s. In 1972, the Educational Testing Service carried out a study to determine why educators at that time had not been particularly enthusiastic about the use of computers in education. (Anastasio et al., 1972) The study concluded that the principal reasons were: their high cost, the unreliability of the technology, and the inadequacy of teacher training. Also mentioned as factors in the study were educators' skepticism about results, and negative feelings about computers dehumanizing education.

That study was based on educator reaction to the only use of computers in education at that time, which were IIS-like CAI systems, yet the conclusion drawn by many educators, politicians, and the media for years to come was that computers, in general, were not effective or appropriate for use in schools. As a result, throughout the 1970s there was very little administrative support or local funding for computer use in schools, despite the availability of a number of mainframe and later minicomputer-based CAI programs, including CCC, PLATO, and Time Share Corporation's Dolphin System (later acquired by Houghton-Mifflin). Those systems, the progenitors of today's IISs, were bought in small numbers almost exclusively with federal funding targeted for the "disadvantaged."

Fortunately, the advent of stand-alone microcomputers in 1979 revealed and stimulated interest in a whole range of possible uses of computers in education beyond CAI, including motivational learning games, student and teacher productivity tools such as word processing, spreadsheets, database activities, simulations, telecommunications, creativity and publishing tools, and much more. Although, as with all use of computers in schools, there are really no reliable studies showing conclusively that any of these computer applications have a long-term ameliorative effect on test scores, there is little doubt in the minds of millions of teachers, students, and parents that such uses of computers enrich their learning and their lives.

Recently, however, with the increasing technical reliability of local area networking (LAN), many schools are linking their stand-alone microcomputers, primarily to achieve certain managerial and administrative goals. In itself, such use of networking can have positive effects on education, in particular more cost-effective use of limited hardware and software resources. Nevertheless, some of us worry that in too many schools networking is being used to turn back the clock, to reduce stand-alone microcomputer use and functionality to that of a terminal on a mainframe computer.

IISs use computers in exactly the same way that the ETS study found to be unpopular with educators in the early 1970s, and it is our fear that when educators determine that today's IISs are similarly ineffective and inappropriate, there will once again be a backlash against all computer use in education. Already, some administrators are beginning to realize that the on-going high costs of these systems may not be justified by the modest short-term test score gains they appear to engender.

A Brief Critique of Studies of IIS Effectiveness

In making their sales presentations, some IIS companies contend that "the research" has shown their systems to be effective in, among other things, raising test scores. Various school administrators have made similar claims in studies carried out by their school systems. However, according to EPIE:

> *EPIE would have liked to have been able to include results of independently-conducted, longitudinal, quantitative studies of IISs. Unfortunately, EPIE was unable to identify a body of such studies. This finding is confirmed by Dr. Henry J. Becker of Johns Hopkins University, an expert in research and evaluation methodology, who has investigated several studies to see if any meet the requirements of scientific design. To date, he has not identified any that meet this criterion. (p i.3, Sherry, 1990)*

Dr. Becker has carefully analyzed numerous studies commissioned by IIS companies, as well as those carried out by the school systems themselves, and has found none which can reasonably claim to have demonstrated the successes claimed in the study. Similarly, this author has read and analyzed virtually every study cited by IISs to bolster their sales argument and has found them all to be unpersuasive.

First, a large number of the studies cited were commissioned by, or done in close co-

operation with one or another of the IIS companies, and hence are suspect from the outset. Second, the claims made by representatives of some of the IIS companies regarding the results of such studies are, for the most part, not even supported by the studies themselves; this is especially true where results are too weak to be considered statistically significant or where the experimental design does not permit drawing the conclusion claimed.

In light of these criticisms, it is unfortunate that representatives from many of the IIS companies insist upon citing these various studies to support their sales efforts, particularly for IIS use in at-risk programs. Ultimately, this tactic is likely to backfire when post-IIS test results in these districts fail to meet expectations.

A Critique of IIS Philosophy of Educational Computing

In addition to doubts about costs and effectiveness, an increasing number of concerned educators, including this author, are expressing their doubts about the educational philosophy of most IISs. To us, IISs represent a step backwards, a retreat from the great progress educational computing has made since the days of mainframe-based CAI. Moreover, they embody a model of education and educational decision-making that has persistently failed to attract the support of teachers and other educators since the late 1960s. As such, these systems are likely to fail once again. Our hope is that this failure will not adversely affect all of educational computing.

It is thus important to distinguish the underlying philosophy of educational computing of most IISs from that of the majority of computer-using educators, who have long since progressed beyond mere CAI. Let us begin this by contrasting certain basic assumptions of more progressive educational computing with those of most IISs.

1. Despite our enthusiasm for computer use in schools, most computer-using educators believe that education is, at base, a human endeavor. It is first and foremost an interaction between people (student-teacher and student-student). Machines can be useful as tools, but not as stand-in teachers.
2. Most computer-using educators also believe that teachers and students should control computers, not be controlled by them. Computers can be powerful tools of productivity, creativity, and empowerment. All students and all teachers should be provided with access to and training in the use of such tools.
3. Most computer-using educators believe that when decisions are made concerning computer use in schools, extreme care must be exercised so that educational value is not sacrificed for bureaucratic convenience. Otherwise, the children may suffer.
4. Most computer-using educators have learned from painful experience that unless teachers are involved at all levels of decision making concerning computer use in schools, implementation of the computer program will likely fail. (Coburn et al., 1984) Moreover, in light of the recent move toward "school restructuring," it would appear to be politically unwise for district-level administrators to impose major curriculum programs on their schools.

Computers as Facilitators of Higher-Order Thinking Skills

Most thoughtful educators today recognize that unless children have the opportunity to develop the thinking structures necessary to process new information, all the basic skills training in the world will come to naught. Used creatively and appropriately, computers offer a unique opportunity to provide children with interactive environments in which they can develop these higher-order thinking skills.

Numerous software publishers have for years published dozens of programs aimed at promoting student critical-thinking and problem-solving skills. These programs have been used by thousands of teachers with millions of children with great enthusiasm and success. Yet, almost without exception, the IISs eschew such approaches to facilitating higher-order thinking, in favor of CAI aimed at low-level basic skills. Although some IIS companies claim to address higher-order thinking skills, in few of these cases do the claims stand up to scrutiny of their product.

Today, schools wishing the administrative convenience of networking, without buying into the narrow basic skills-focused IIS vision of education, can do so because most educational software publishers are making many of their stand-alone programs available in forms that will run on networks. This includes hundreds of programs aimed at facilitating student higher-order thinking skills. Even owners of most IISs can use (and indeed are using) such programs, either by installing them on the network alongside the IIS curriculum, or by booting

stand-alone versions of these programs in the floppy disk drives at the student work station. It should be noted that in most cases, these IIS owners are doing so without the cooperation of the IIS companies, despite the fact that many of these companies advertise "third-party" compatibility.

One approach to using computers to promote higher-order thinking skills with at-risk students is particularly worth mentioning because it also emphasizes the importance of human interaction in a computer-mediated instructional setting. This approach is the Higher Order Thinking Skills (HOTS) Program developed by Dr. Stanley Pogrow of the University of Arizona. (Pogrow, *Phi Delta Kappan*, 1990; Pogrow, *Educational Leadership*, 1990 and numerous other papers and articles by Pogrow on HOTS) HOTS is not a software program; it is a method in which teachers use off-the-shelf software with children in particular ways that systematically build all-important critical-thinking skills.

HOTS uses computers and special teaching techniques, particularly Socratic dialogues between students and teachers, to develop student thinking and social skills, as well as to increase student self-esteem. The HOTS strategy is proactive, rather than remedial. Instead of reteaching an atomized series of out-of-context "basic skills" over and over again, HOTS provides students with the general conceptual skills that then enable them to learn and retain the complex ideas and information found in most curricula and to do so the first time they are taught – by their classroom teacher.

Implemented as a pull-out program with Chapter 1 and mildly impaired learning disabled students in grades 4-6, HOTS has been validated by the National Diffusion Network. Among other documented successes, HOTS students are currently surpassing national averages for basic skills gains in reading and math, and some HOTS students have actually been rediagnosed as "gifted and talented." This is an especially remarkable result because HOTS does not explicitly teach basic reading and math skills; instead it teaches the underlying thinking skills that enable students to confidently handle new and unfamiliar educational and intellectual challenges they encounter in the classroom, on standardized tests, and in life. If there is any IIS program that has been able to match HOTS in terms of independently validated results, particularly results that last over time, this author is unaware of it.

Computers as Vehicles for Creative Expression

Throughout society and in thousands of schools across the country, computers are used as vehicles for creative expression. Computer-based paint, drawing, and printing programs are used by children to express themselves in the graphic arts. Computer-based music composition and performance programs enable students to explore their musical talents. Word processing, classroom publishing, and other writing-based programs provide students with power tools to express their thoughts and ideas in writing.

Yet none of the IIS programs provide graphics or music programs, and only a few contain any kind of a word processor, let alone a child-appropriate word processing or publishing program. Worse, the use of most IISs to process children through endless sequences of CAI lessons chews up so much of a school's limited and precious computer time that there usually isn't room or time for the children to use creative computer tools in the relaxed and contemplative atmosphere such use requires. Thus, it is not enough that a school is able to buy stand-alone creativity programs to use alongside their IIS program, they must also re-prioritize so that students have the right kind of access and time to use these tools creatively.

Moreover, a school that wishes to supplement an IIS with computer-based creativity tools must configure their computer workstations and on-line printers in such a way that individual students can save and print their products at or near their local workstations. In contrast, many IISs are set up so that all saving is to the file server (since all that is saved is records of student CAI activity) and all printing is to a remote and secure central printer (since all that is printed are reports of student CAI activity).

Computers as Tools of Personal and Professional Productivity

Our society, both in the workplace and at home, has been transformed by the emergence in the last ten years of personal and professional productivity tools such as word processors, desktop publishing programs, database managers, and spreadsheets. This fact has been recognized by educators across the country for at least the past five years, as school after school

has made these power tools available to their students in a variety of ways: many elementary school students learn the fundamentals of keyboarding and word processing, so they can write short stories and reports on the computer; many middle-school students add to their word-processing skills the experience of using content-area databases to actually research interesting questions in social studies and science; at the secondary school level, many students also get the opportunity to use more quantitative productivity tools such as spreadsheets, statistical packages, and function plotters in their business, social studies and math courses; and desktop printing in schools has become so prevalent at all levels that it is often called "Classroom Publishing."

Yet none of these tools is available on most IISs. Again, while it is possible with most IISs for a school to buy such programs, many of which are now available in network versions, and to use them side by side with the IIS, this is rarely done. Why? First, because the IIS chews up virtually all available computer time. And second, because after investing sometimes hundreds of thousands of dollars in IISs, there is little money (or professional commitment) remaining for other software approaches. With that kind of investment, what administrator can afford to have the computers used for any other purpose, but the one aimed directly at improving test scores?

This may well be the most serious indictment of IISs, since it means that when computer resources are devoted to IIS training on traditional basic skills, the children, particularly those at risk, are being denied the opportunity to learn the productivity skills that they will need in their lives and in almost any line of work in the twenty-first century. This is not unlike the tragic situation in too many Vocational Education programs in which the neediest students are taught outmoded vocational skills on outmoded equipment, thereby dooming them to the most menial, unskilled labor.

The Role of Computers in Cooperative Learning Environments

Collaborative learning is more than an educational buzzword. It is an educational reflection of the emerging work place of the 1990s. As a result of both technological advances and business practices, more and more offices and factories depend on their employees to work cooperatively on every aspect of a project. And in the more forward-looking schools across the country, collaborative learning is both a means to and an end of many classroom activities.

Just as computers play a major role in collaborative activities in the work place, so too may they play such a role in collaborative education in the school. Two outstanding examples of this are The Kids Network, developed under a National Science Foundation grant by TERC in Cambridge, MA, and Earth Lab, developed under various grants by the Bank Street College of Education in New York City.

The Kids Network, now published by National Geographic, has gotten so much press attention recently (e.g. White, 1989) that it will not be discussed here in detail. Suffice it to say that in this program, students all across the country (and the world) collect real scientific data and send it via modem to real databases, where real scientists use it to study real phenomena. Talk about empowerment, collaborative learning, and developing real-world skills!

Earth Lab is still at the stage of being implemented at a single pilot site, the Ralph Bunche Intermediate School in West Harlem, NY (Newman and Reese, in Sherry, 1990). There, both in two computer labs and in various classrooms, students, many of whom are severely at risk, work quietly and enthusiastically at Apple IIe and GS computers connected by either a Corvus or an AppleTalk network. On both network systems, teachers and students can communicate written materials, notes, assignments, etc. through an electronic mail feature built into The Bank Street Writer III. In addition, students work on science investigations, in small groups and as a whole-school team, by pooling data they collect in "work spaces" that are specifically set up by project on the network to facilitate such collaborative learning activities. In this way, student learning and instruction emulate the workplace by organizing all activities around projects and problem solving, rather than as a sequence of disconnected skill lessons or individual software programs, selected from a network menu.

Students at Earth Lab can also play a real-time network-based simulation game with other students. Finally, they can access any one of dozens of network-compatible educational programs or boot up stand-alone educational software on disk drives at the workstations. These selections may be student-initiated or assigned by teachers, often by "leaving" an assignment in the student's mailbox, not, as in many IISs, by having a student locked into a lesson by the system.

Earth Lab is a dramatic example of how a network environment can be used to promote specific empowering educational objectives and at the same time be open enough to accommodate individual teacher priorities and individual student interests.

Computers as Multiple Modality Learning Environments

Beyond the rhetoric and marketing hype of educational multimedia is the important recognition that all children, especially today's MTV generation, learn through many different modalities. The technologies of interactive videodisc and CD ROM, with other multimedia technologies to come, are now presenting educators with ways to provide multiple-modality learning environments for their students. Nowhere is this opportunity more welcome than for students at risk.

This year educators are being treated to a cornucopia of new multimedia products including: ABC Interactive's current events videodisc

series with titles on Martin Luther King, the Holy Land, and Election 88; National Geographic's history videodisc product *GTV*, complete with a "map rap;" Scholastic Software's multimedia educational productivity tool *Point of View: The Scholastic History Processor*; and a number of multimedia authoring systems like *Tutor Tech*, *HyperStudio*, and *HyperScreen*.

All the other multimedia products referred to earlier come complete with lesson plans, connections to the curriculum, and most importantly, easy-to-use authoring tools that enable students and teachers to create their own multimedia reports, presentations, and lessons, using superb footage from these videodiscs and any others the school might own or acquire. Now that's empowerment!

Computers as a Means of Empowerment

Let us conclude by reaffirming the desirability of using computers in all schools in the ways they are used in society: to empower their users. This means that computers should be used as personal and educational productivity tools by teachers and students. A corollary to this goal is the view expressed in writing and in speeches by countless educational computing leaders, that it is a waste of computing power, financial resources, and human potential to use computers for endless, lock-step atomistic CAI lessons.

Instead, computers should be used by teachers to write lesson plans, reports, handouts, and notes to students and teachers; to comment on student written work and other forms of expression; to keep track of student progress in their classroom activities; to facilitate classroom presentations and demonstrations; to keep up with professional developments and share ideas with colleagues; etc.

Thus, teachers need a computer workstation, loaded with personal and professional productivity software, at their desks, linked via network to student workstations in the classroom or lab. And they need a similar arrangement at home, linked to the school by modem. Is this vision too futuristic? Not if we regard it as a guiding vision that we can work toward gradually. Many of us prefer such a vision, even if it cannot be fully implemented today, to the spectre of IIS administrator-controlled, centralized, record-keeping systems with little or no direct access by teachers. Apparently, so do the major teachers' organizations, to judge from a number of Albert Shanker's recent speeches and the NEA's request for information from the hardware companies for an affordable teacher workstation, similar to that described above.

Like their teachers, students should have the opportunity to use computers to explore ideas, to analyze data, to write papers and stories, to receive and carry out written assignments, to research databases, to design, compose music, publish, plan, work with a team on projects, etc.

Thus, students should have almost constant access to a computer workstation in the classroom and the lab, linked via network, to a fileserver containing a vast array of productivity software, creativity software, wholesome recreational software, educational software, shared hardware resources, shared databases, telecommunications capabilities and much more.

This vision is not futuristic in the least. All of this is possible and is in place today in schools that prefer this vision of education (and networking) to the narrow vision of computer labs filled with students working in 20-minute chunks of time on "byte-sized" lessonware, controlled by an impersonal lesson sequence, developed by a distant software publisher.

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Dr. Peter Kelman is Publisher of Scholastic Software, 730 Broadway, NY, NY 10003.

If 2 + 3 is always
going to be 5,
why do they keep
teaching it to us?

A first grader

Empowering the Teacher

by David Dockterman

Reprinted with permission from The Professional Teacher, the newsletter of Tom Snyder Productions Inc., Educational Software

Let me be among the first thousand or so people to recommend Tracy Kidder's new book *Among Schoolchildren* (Houghton Mifflin, 1989). He truly captures the complexities, the joys, and the frustrations of teaching. You can't help but appreciate and respect the awesome responsibilities accepted by a caring teacher.

The timing of the book is perfect, too, because, as we start a new school year, it helps put things in perspective. Chris Zajac, the fifth grade teacher-heroine of Kidder's book, faces personal insecurities, problem children, neglectful parents, language barriers, and more. What should she do about the child who refuses to do homework? Which children should sit next to each other? What about discipline problems? Managing the complicated social and academic dynamics of a classroom is an awesome task – children from different backgrounds, from broken homes, with differing abilities and attitudes. Never once do you say to yourself, "If only she had a computer..."

False Promises

The computer industry is not alone in promising pre-packaged "solutions" (I hate that term in this industry and all that it implies) to incredibly complex educational problems. Just plug it in and not only will your students learn more, they will have brighter teeth. We should have learned by now that it's not that simple. After all, over the decades we have watched one technology after another parade through the classroom. We've witnessed new math become old math, classrooms without walls turn into classrooms with walls, and open schools transformed back into closed schools. Why should our "new" innovations, particularly computers, be any different?

We have to realize that real "solutions" cannot be purchased in padded cardboard boxes or in sturdy vinyl binders. The issue is really much bigger than interactive technology or writing across the curriculum or whole language education.

Our schools have a long history of pushing innovation into the classroom without supporting or involving those designated to do the innovating. Who ever asked teachers if they wanted classrooms without walls? As with change in any setting, those at the center of it must be invested in it, whatever "it" is.

Setting the Right Priorities

Part of the problem lies in the fact that we often lose sight of our goals. Technology can help with the goal of improved teaching and learning. It is essential to remember, though, that the computer is only a medium to a larger end. Our (meaning those of us caught up in this "computer revolution") goal is not the proliferation of interactive machinery. It is not more teachers using more computers. Computers will only serve the desired end if they are employed as tools for professional educators.

So, making teachers feel professional (a great use of this technology) may be the most crucial first step in working toward successful change, computer-based or not. Computers will not implement themselves any more than film projectors, open classrooms, or basal textbooks will. Good education comes from good teachers. And that's where our emphasis should be.

Constructive Conclusion

So what am I suggesting here? More training and staff development? Sort of, but not really. We need to do more than just teach teachers how to implement new devices and ideas. After all, our goal is more great teachers, not more teachers who use computers. Besides, demonstrating to teachers how they can develop their own multi-media curricula is pretty much a waste of time if they have little access to equipment and barely enough time to even preview a film. Deeper changes are necessary, both in attitudes and in structure.

Teachers need to feel empowered. They need to be willing, even anxious, to accept new responsibilities for their classrooms and their subject areas. And schools need to support and nourish that kind of professional growth.

I hope that Tracy Kidder's book will help renew or actually stimulate popular respect for teachers. And I hope that teachers will continue to grow to respect themselves. I saw a number of workshops this summer on building self-esteem, not students' but teachers'. The growing commitment in the nation toward professionalizing teaching bodes well.

Confessions of a Maverick Moderate

by Anne Beversdorf

Reprinted with permission form the CUE Newsletter

This is a closet case. Being a moderate is hard to talk about. It's unfashionable, always has been. When folks rave on about the latest in fashion it's embarrassing to say "Why'dja change?" It makes you sound like a fuddy-duddy. No matter what the *latest thing* is, a moderate always seems to be on the other side – the outside, definitely not the "in" side.

But I'm a moderate and I'm an educator and I'm finally ready to talk. Now, I don't *like* being a devil's advocate, but education just has this crazy tendency every few years to throw out the baby with the bathwater. Was it just yesterday that "back to the basics" was the hue and rallying cry? Sure, kids have to know "basics" – but you can't just toss out all the good books and the innovative broad-spectrum curriculum activities and still have good education. But of course, that's exactly what happened. Now we recognize what we lost, but have we learned?

No way. Now we're throwing out the basics and focusing exclusively on concept-based education. I recently heard an administrator from a large California district say "We don't want to teach *any* basic skills!" Slip of the tongue? I hope so. But today the very word "skill" is tainted as everyone jumps on the "conceptual teaching" bandwagon. When are we going to figure it out – that we can't have well-educated kids without addressing BOTH! I have a friend who says he's finally understood the implications of these pendulum swings. By the time he's watched it swing three times, he'll be able to retire!

As computer educators, we aren't immune to educational fads. It's just a little trickier to spot them, because the pendulum swing is disguised by all the changing opportunities presented by technology changes.

In the early eighties the discussion was "What is the appropriate use of the computer in education?" The answer, of course, wasn't an open discussion. The answer was "simulations." We weren't supposed to waste this technology on stupid things like drills. But hang on a minute here...there are some facts it's useful to know by the time you grow up. Good old boring, basic arithmetic facts, for one. Without a few of these facts at your fingertips you can't even guestimate answers to practical, real-life questions – like if a $50 shirt is on sale for 20% off, do you have enough money to buy it. Think now – is it better to spend a professional teacher's time on these basic facts or utilize a computer for basic facts and leave the teacher free to foster the child. Who's more valuable – the computer or the teacher? Naturally, this isn't a question that was often considered.

Oh, yes, and we've also watched the rise and fall and phoenix-like rebirth of managed curriculum systems over the past decade. In, then out, then in again, this time with major companies dedicating tremendous sales and marketing budgets to convince us that *their* system has everyone's answers to details we should be handling ourselves - details like, "Is this system teaching *what* we teach that way we *want* to teach it?" And, "What if every teacher teaches with a different approach?"

This time the operant phrase is "Integrated Learning System" – a piece of jargon that I have tried (and failed) to analyze for meaning. *Integrated* with what? (The answer is usually "itself"). What's a Learning System? A system that learns? Kids that learn systems? Or is a student a learning system? Some of these companies claim just using their system will "increase student scores." Wait a minute – shouldn't the teacher have something to do with this? Who's in charge here – teachers and local schools? or some *company* in another state?

The new software buzzword is "tools." As in, "Oh, no. We don't want to do curriculum software. We want to do *tools*."

Hey folks, let's do lunch! Remember when you couldn't get a teacher to even use a database? When it was swimming upstream to suggest how much you could *teach* using a database in social studies; or a word processor in language arts? But why is it that once everyone's sold on something new they all feel compelled to throw out everything old? Is *this* good modelling for our students? I thought learning, growth, wisdom were based on the

incremental accretion of knowledge – not on denying the validity of each decade's accumulated wisdom. Now that we have good curriculum-based software, let's not throw it out of our planning in our rush to use *HyperCard*, desktop publishing, and increasingly complex productivity tools.

Remember when personal computers were brand new and we all kept hearing, "BASIC is so easy teachers can develop their own software"? Some did – kind of the same way teachers can write their own textbooks, right? Some do, then they stop being teachers.

Now we're hearing, "Interactive Media is so easy that teachers can develop their own programs." Some do. Whadaya wanna bet, that in five years we'll have a good supply of interactive multimedia programs available from software publishers and they'll stop pushing us to write our own. New products are coming out every day now, and they keep getting better – just like plain-old curriculum software did ten years ago.

I think it's time we reopen the old questions: Here are my suggestions for answers.

What is the appropriate use of a computer in education?

A computer should be a tool in the hands of a human being. Human beings include both students and teachers. A computer is only one way for students to learn. Important learning also occurs on the playground, in the sandbox, and with the novels you used to read after bedtime with a flashlight.

What is the appropriate use of a professional teacher's time?

Teachers should be teaching, working with some students one-on-one on a difficult problem, coaching and encouraging each student to find new ways to think about and evaluate the world and its problems, and helping students learn to express themselves clearly and creatively. But teachers are almost unique among professionals in that they are their own clerical support – spending incredible amounts of time xeroxing paper, grading the-answer-is-right-or-wrong quizzes, and doing other non-professional clerical tasks.

What is the appropriate use of a human mind?

Each human being should be provided with the tools necessary to develop a rational, well-thought-out answer to this question as it applies to his or her own life. One of these tools is a good education. "Being educated" implies a strong foundation in factual knowledge as well as the ability to think, decide, ponder, discover, and create, both independently and as part of a group. Without a strong educational foundation, a person is handicapped in the ability to determine the direction and purpose of his or her life. A human mind should be educated to the extent that it is possible to determine his or her own best potential.

So let's think again – *What is the appropriate use of a computer in education?*

A computer should be a treasure chest of creativity tools – *HyperCard, Linkway, Super Story Tree, AppleWorks,* graphics and art programs, music composing programs. My father, who was a composer, scratched away at musical scores, tapping each note out on a piano, imagining what it would sound like as a group of different instruments. What he could have done if he had the tool to enter the notes and instruments and hear them – and edit and change them! Just think what our students can do with this kind of power!

A computer should be the "spoonful of sugar" to help get necessary memory-based facts down pleasantly. Kids have so much fun with *Number Munchers* they hardly realize they're learning arithmetic facts and estimation skills to the point of "automaticity." Computers help students reinforce this type of information more quickly and with more "engagement" than a teacher can. Other curriculum-based software helps students apply already-learned skills in order to learn new ones. Simulations allow students to role-play, try-out, and experience situations "first hand." Not new news. Not sexy. But tried and true.

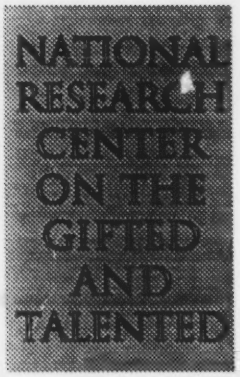
Computers should be teacher tools – providing vast data banks for students to search in their own way. *World Geograph* and *USA Geograph, Culture* and *Point of View* are full of data and images linked together by the "point of view" of the student researcher.

Computers should be teacher tools – and not only for "gradebook" activities, or for the "letters to parents." Computers should provide alternate learning modes defined by, and aligned specifically to, each teacher's other classroom activities. Computers can and should reinforce and report learning progress on "fact-based" knowledge so teachers can spend grading time on higher-level processes that can't be evaluated by the computer – things like evaluating student progress in creative writing or helping a disturbed youngster learn to evaluate options and consequences of behaviors.

Computers should be used to maximize the potential of teachers as teachers, students as students, and human beings as human beings.

Being moderate isn't very exciting. "I believe a little of this and a little of that" isn't generally good copy. Extremism is exciting. Excess is newsworthy. But the next time someone says to me – "Oh, we're not doing *that* anymore," I'm not going to stop with "Why not?" When they say, "Because this is the way we're doing it now." I'll say, "But that doesn't tell me why you stopped doing *that*. What's wrong with doing both? What are your real teaching needs? What do your students need to know? Is any single solution the real answer?"

Anne Beversdorf is president of Beversdorf Associates, an independent software distributorship dedicated to helping teachers and schools select and use classroom-aligned software.



An Investigation of Giftedness in Economically Disadvantaged and Limited English Proficiency Students

by Mary M. Frasier

Despite strong recommendations from scholars and researchers to use multiple criteria when seeking to identify students with extraordinary gifts and talents, an examination of current practices reveals that school districts continue to rely heavily on IQ scores. This practice often keeps disadvantaged, culturally different, bilingual, or minority students from being identified for participation in gifted programs. The first-year project being conducted by the University of Georgia, one of the four universities participating in the National Research Center on the Gifted and Talented, is concerned with this problem. The project will investigate new ways to measure the talents of students from historically underrepresented groups.

Study Assumptions

The study proceeds on the assumption that there are significant numbers of these students who do not meet traditional criteria for gifted programs, but who may possess cognitive, motivation, artistic, or creative potentials that clearly enable them to competently participate in programmatic experiences designed to develop and nurture gifted behaviors. The study proposes (a) to approach the identification of gifted economically disadvantaged (ED) and limited English proficiency (LEP) students from an intensive investigation of gifted behaviors within and across cultural groups; and (b) to examine giftedness in target students by analyzing the development of intellectual processes and functioning within the cultural context of ED and LEP populations; and to extend the theoretical orientations of earlier researchers who emphasized the need to focus on the strengths in children from diverse cultures if we are to understand their gifts and talents (e.g., Torrance's focus on the creative strengths of black disadvantaged children expressed in his 1977 *Checklist of Creative Positives*, and Bernal's 1974 ethnoscientific perspective on identifying giftedness in Mexican-American children). It is expected that this investigation will lead to the development of a new paradigm that accommodates the differential manifestation of gifted behaviors in ED and LEP student populations.

Target Populations

The target populations will include students who are economically disadvantaged from black, Native American, Hispanic, Asian, and Caucasian groups and limited English proficiency students who are not represented in these groups. Target students will be selected from urban and rural settings.

Research Questions/Data Collection

Research questions to guide data collection include those dealing with the self-perceptions of ability held by these potentially gifted students and their parents; the role that these self perceptions play in achievement; the nature of significant behavior and performance indicators of potential; the nature of home environments; the method by which conflicts are resolved between the school and home cultures; the manner in which self- and other perceptions affect the nomination of target students; and the relationship between self-reported perceptions of ability and literature citations.

Themes and patterns that emerge will be classified into four broad categories: (a) behavioral and performance indicators of gifted potential; (b) environmental features, services, and people that support or hinder the development of gifts and talents; (c) familial characteristics that support or discourage achievement; and (d) self-perception data or personal judgments of competency or adequacy. Data will be collected from multiple sources including (a) non-test sources, such as written responses to open-ended questionnaires, in-depth interviews with subjects, interviews with parents, information from school records, and checklists of student behaviors that assess talent potential; and (b) test sources, such as appropriate intelligence and achievement tests, creativity tests, and self-concept tests.

Data Analysis/Profile Development

Qualitative methodologies will primarily be used to analyze data to determine common themes. The resultant theme sheets will be compared and contrasted to reveal similarities and variations in themes. Data will be displayed on the Frasier Talent Assessment Profile, a system designed to facilitate the interpretation of data from test and non-test sources. It is expected that this data will form the basis of an identification paradigm that accommodates the determination of gifts and talents in culturally diverse groups.

Collaborative School Site

Collaborating school districts or target school(s) within a school district are invited to participate in this study if they have the appropriate concentration of target students. Data collection will be conducted on-site in some settings and by survey at others. For further information, contact Dr. Mary M. Frasier, NRC G/T, 320C Aderhold Hall, The University of Georgia, Athens, Georgia 30602; 404/542-4301.

Gail Marshall,
continued from page 1

cabulary and techniques of change, it is even more difficult to be on the outside looking in. Change is too pervasive, too all encompassing to wait for stragglers. Change moves ahead, and, if we don't keep up, we find ourselves cut off from conversation, company, jobs.

Today, at the end of the twentieth century, we're in the midst of new revolutions. We read about the paperless office and hear about the computer classroom. Our first inclination may be to turn away, to reject technology, saying that it is too radical a departure from a long unbroken tradition of schooling which is personal, simple, and rooted in Greek and Roman values which have continued from Socrates to Sesame Street. Using computers seems to depersonalize education. It seems to disconnect a vital teacher-to-student bond that transcends what is to be learned and is, in fact, a microcosm of the ideal society. For many of us a teacher is a role model of the ideal citizen, a counselor, a master craftsman to the students' apprenticeship. What machine can replace the dialogue, the wisdom, the intuition of a teacher? No machine! But does that mean the idea of the computer classroom is an ephemeral idea. Does that mean we reject computers in the classroom? No! The computer is here to stay. It is as much a part of our lives as the combustion engine, the telephone, and the microwave – all inventions that were supposed to be fads. Talk about computers is as pervasive as the Romans' gossip about the colors on the Sistine Chapel ceiling. Bypassing the computer revolution is as likely to induce angst as ignoring the combustion engine.

In fact, the computer is a logical extension of a move toward change that drove our ancestors out of the caves and into the villages. Change is scary. Change is difficult, and change is expensive, not only in terms of dollars, but also in terms of time, ego, and temper. Change is uncertain. Facing a move toward a computerized school environment we rightly ask, "How do I know that my students will still feel a personal connection with learning?" We can also ask whether or not the computer becomes an end in itself. "Does introducing a computer into the classroom mean that Pac Man and not Shakespeare (or Mark Twain or Euclid) reigns supreme?"

Pac Man, arcade games, adventure games and programming tricks already exist for students. The majority of today's students have easy access to video games, personal computers, CDs, and all the other paraphernalia ordained by the teen culture. Technology is all around today's students. It isn't a matter of locking technology out of the classroom. The Luddites didn't drive out the mechanized looms. Change calls for accommodation, not rage or ennui. Accommodating to classroom-based computing means harnessing the power of the computer to achieve a wide range of goals for today's students.

Once we realize that technology in the form of computers is here to stay, setting goals for that technology becomes the major issue. Just as Newton's discussion of physical laws in the universe didn't automatically transform our world, so planning for classroom change involving computers isn't going to be easy or straight-forward. Setting goals involves a vision, and vision, like the dollars needed to fuel the vision, is in short supply. Many of the technology czars who promote school-based computing have no vision beyond buying and installing computers, and then turning them over to teachers with a "Fare thee well." Those computers can be either an albatross or a life saver. But vision can make the difference between being controlled by computers or harnessing their power to stimulate students.

Your vision doesn't need to include boring, repetitive drill—although many computer classrooms are dedicated to nothing but drill and practice exercises. Your vision needn't be shaped by the thought of a "laboratory" where every student is working on exactly the same task, and scurrying through computer-driven exercises like a rat in a maze. Nor should your vision be limited to a single computer that each student in turn uses for 10 or 15 minutes a day.

An effective application of your vision is to create "microworlds" for your students. If you're working with gifted and talented students and you want to inspire and challenge them, computer microworlds can elevate classroom learning to new dimensions. Imagine a microworld where young students, whose skill with protractor and compass is such that drawing angles and circles is boring and frustrating, instantly create triangles, re-size the triangles, experiment with changing the size of the angle, and then inscribe circles, squares, and other triangles within the triangle. One or two keystrokes on the computer allows students to experiment with space and shape with a flexibility and fluency that even Euclid would envy. Other microworlds let students create their

own Newtonian universe and test the laws of gravity. Just a few keystrokes and speed, acceleration and refraction experiments are under the students' control. Young students as well as older students can work a wide variety of logic problems with the computer as patient a tutor as Socrates.

Cooperative problem solving involving decisions about public policy, space exploration, or energy consumption is possible in the microworld of simulations. Group 2, 10, or 20 students in front of a computer, explain the rules of the microworld, and then watch as students grapple with problems for which easy solutions aren't possible and collaborative brain storming is essential. Today's computer-using students can access software that puts them directly in touch with scientists conducting research or with students whose culture and traditions are markedly different. Imagine your students telecommunicating with villages in rural Canada, where climate, flora, fauna, language, and curriculum are different from your community's. Consider the possibilities for intellectual growth when your students can access data from a variety of government agencies, analyze the data, and look for trends. Think of the impact on those math whizzes in your class who can telecommunicate and download the Dow Jones quotations daily, and then compute the percentage of change, the rate of growth, and the rate of return on investments.

Gifts and talents come in all forms. Just as everyone in Michelangelo's Rome wasn't an artist and every Englishman wasn't an inventor, so each student comes to school with unique talents. Computer-based music systems can support the development of a young musician's talent. Computerized drawing programs foster an excitement about art. Programs dedicated to spatial reasoning provide a challenge for the pre-engineer. And bringing the hardware and software of today into your classroom makes it possible for your gifted and talented students to get ready for the next revolution because institutionalizing change by accommodating to it makes for flexible, fluent thinkers. Just as most Romans didn't wear eye blinkers to screen out the art being created all around them, our students shouldn't be oblivious to the cognitive growth dimensions fostered by today's microworlds. Just as citizens in the days of the Caesars prided themselves on saying they were citizens of the widest-ranging empire the world had seen, and just as John F. Kennedy's statement that he was a Berliner roused the emotions of the world, our students, all of them, ought to say with pride that they are participants in the technological revolution.

Gail Marshall is a software developer, and also teaches in the Master's degree program for computer-using educators at Fontbonne College, St. Louis, MO

The Iliad

Ten bitter years the Trojan War lasted,
To win Helen back from Troy.
The Greeks and Trojans fought non-stop,
Yet out of this came joy.

Achilles and Hector led both armies,
And Troy seemed to be in the lead..
But a big wooden horse
saved the Greeks,
And Troy was punished for its deed.

Odysseus did not sail home
with the Greeks,
Across the big blue sea.
He searched for adventures and
excitement for years,
But that's the *Odyssey*.

by Christa Simpson
Grade 7
Sowers Middle School
Huntington Beach CSD
Teacher: Wendy Hayes

ANNOUNCEMENTS

CAG Seeks Assistant Editor for *Communicator*

The position of volunteer Assistant Editor will be open to CAG members. Please send a letter of interest and summary of qualifications to Sharon Mountford, Administrative Assistant, 23684 Schoenborn Street, Canoga Park, CA 91304. Applications will be reviewed and interviews will be scheduled by the Executive Committee and Editor of the *Communicator*.

Job Description

1. To assist the Editor in performing these tasks:
   - determining the focus and theme of each edition of the *Communicator*
   - corresponding with potential authors of articles and working with authors who have committed to write for the publication
   - soliciting manuscripts for the *Communicator*
   - selecting manuscripts
   - editing manuscripts
2. To assume the position of Editor of the *Communicator* when the position becomes available. Note that the Assistant Editor will be considered to be in training for the position of Editor when it is vacant. The Editor is also a volunteer position, but serves as a full member of the Board.

Smithsonian Intern 91

Seniors... Enjoy an exciting summer internship in Washington, DC. The Office of Elementary and Secondary Education at the Smithsonian invites current high school seniors to apply for a summer internship with the museum. The 6-week sessions give students a chance to be involved on an assignment with a Smithsonian professional, spending about 35 hours per week. In addition the interns share their work with others through seminars and have opportunities to explore Washington.

There is a $550 stipend for living expenses plus housing in a nearby dormitory and transportation to and from Washington, DC, via the least expensive common carrier.

If you are interested, contact the Smithsonian Institution before March 8. That is the deadline for sending out informational packets. Phone 202/357-3049 or 202/357-1696 (telecommunication device for the deaf).

CALENDAR

February 15-17, 1991
CATE Conference
(California Association of Teachers of English)
Los Angeles Airport Marriott Hotel
For information contact Barbara Zussman, 3545 Mound View, Studio City, CA 91604.

March 1-3, 1991
CAG Annual Conference
Gifted Education: A Capital Investment
Sacramento Convention Center
and Hyatt Hotel
For information call 818/888-8846.

April 20-21, 1991
Talent Identification Program at Duke University
Fulfilling the Promise
A conference for parents of gifted children, Durham, NC
Contact Joy Baldwin, 919/683-1400.

May 9, 1991
Project Open GATE Teleconference
Team and Regional Resource Planning: First Steps Toward a Coalition for Excellence
For information see September *Communicator*.

June 24-29, 1991
Autonomous Learner Model Conference
Estes Park, CO
Contact ALPS, 800-345-ALPS.

July 18-20, 1991
SENG (Supporting Emotional Needs of Gifted) Conference
Perspectives: Views of the Past – Hopes for the Future
Charlotte, NC
Contact Leona Gray, P.O. Box 2745, Dayton, OH 45401.

July 29 - August 2
Ninth World Conference on Gifted and Talented Children
Talent for the Future
The Hague, Holland
For information contact Conference Secretary, P.O. Box 463, 6500 AL Nijmegen, The Netherlands.

Leadership Camp

for 7th and 8th grade students
May 17-19, 1991
Camp Nawakwa
Angelus Oaks, CA

Camp Nawakwa has been the site of CAG's successful leadership camp for the past three years. Located at an altitude of 7000 feet, it is near Big Bear Lake. Complete facilities include 15 cabins, dining hall, and infirmary.

The camp program will be activity-oriented with an emphasis on team building and on the development of personal and group responsibilities. Activities will include drama games, improvisation, a group problem-solving challenge course, New Games, a picnic hike, and a campfire program.

The goal of this week-end camp for seventh- and eighth-grade students is to provide an open, positive, and supportive atmosphere designed to enhance self-esteem, communication abilities, and leadership skills.

Bus transportation will be provided from the Redlands and Montebello areas to the camp. Details regarding bus transportation, medical release forms, and suggested gear will be mailed to registrants.

The cost for this program, including bus transportation as noted above, is $85.
A limited number of campership is available.
Attach a letter outlining family need if applying for a campership.

Please complete this registration form and mail by April 19 to:
CAG, 23684 Schoenborn Street, Canoga Park, CA 91304.
Questions may be directed to the CAG office at 818/888-8846
or to the camp director Barbara Nelson at 619-379-4289.

Name (for name tag and roster) _____

Address _____

City/State _____ Zip code _____

Phone ( ) _____ Age _____ Sex _____ Grade: 7 8

School _____ Principal _____

Please indicate desired bus pickup ❑ Montebello or ❑ Redlands.

Conditions and provisions:

- The camp is for students who are gifted, rapid learners, high achievers, or capable underachievers.
- No discipline problems will be tolerated. Failure to follow rules of the camp will result in the student being sent home, with the parent required to provide transportation.

Payment enclosed:
Check # _____
Charge card information:
Visa ___ Mastercard ___ Exp. Date _____

Number _____

Signature of cardholder _____
Please attach a letter if there are special dietary or medical needs for this student.

_____
Signature of camper

_____
Signature of parent or guardian

MEMBERSHIP·APPLICATION

Please share this copy of the *Communicator* with a friend when you have finished reading it. He or she might like to use this form to become a CAG member and active supporter of gifted education. Because of CAG's role in lobbying for appropriate education for gifted and talented students, dues payments to CAG are not tax deductible as charitable contributions for Federal income tax purposes.

Name: _____
Last *First* *Middle Initial*

Region:

Code:

Preferred address: _____
Street address or PO Box

_____ County (*not country*) _____
City *State* *Zip code*

Phones, home: (_____) _____ Work: (_____)_____ Affiliation: _____
(school district of employment or attendance)

Membership/ Service Category: Outside the USA, please add $5 for increased postage costs.

❑ Individual ($40) ❑ Family ($50) ❑ Patron ($100) ❑ Sponsor ($300) ❑ Life ($500)

❑ Benefactor ($1000) ❑ Limited Income ($15, attach letter) ❑ *Communicator* subscription only ($15)

Role: ❑ Administrator/coordinator ❑ Board of Education member ❑ Consultant

❑ Counselor/psychologist ❑ Parent ❑ Teacher ❑ Other _____

Special Skills/Interests: ❑ Arts ❑ Humanities ❑ Math ❑ Science ❑ Computers ❑ Advocacy/ legislation

Payment enclosed: ❑ Personal check #_____

❑ District check #_____ Charge: ❑ Mastercard ❑ Visa Exp. date_____

❑ Purchase order #_____ Card number_____

CALIFORNIA ASSOCIATION FOR THE GIFTED
23684 Schoenborn Street · Canoga Park, CA 91304

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Organization
BULK RATE
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Canoga Park, CA

NM

Time Value
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